STATE OF KUWAIT
DIRECTORATE GENERAL OF CIVIL AVIATION
AVIATION SAFETY

دولة الكويت
الإدارة العامة للطيران المدني
سلامة الطيران

2025/9/1

2025/60/SUPDT-R/41

All KCASR Stockholders and Users

Subject.: ***Notice of Proposed Amendment's (NPA) No. 2025-20 to Kuwait Civil Aviation Safety Regulations KCASR 14 – AERODROMES Volume II – Aerodromes Heliports Rev 4.***

Dear Sir,

Purpose:

The purpose of this NPA is to announce to the KCASR users the intention of the Directorate General of Civil Aviation to amend ***KCASR 14 – AERODROMES Volume II – Aerodromes Heliports*** (issue 4) to comply with ICAO standers and recommended practices up to amendment (10).

Action Required:

All users of KCASR are required to refer to DGCA/ASD website (https://kcasr.dgca.gov.kw) for reviewing the NPA and mail or email (safety@dgca.gov.kw) their comments to DGCA by 02/Oct/2025 using the attached NPA Response Sheet Forms No. 1500 or using NPA comments & feedback form on the website. If we do not receive your response by this date, it will be assumed that you do not have any comments on the proposal.

If required, the DGCA/Aviation Safety Department personnel are available to answer your questions on the interpretation and intended implementation of the proposed amendments.

This is for your information and distribution to the concerned parties.

Yours Sincerely,

President of Civil Aviation

Abdullah F. Alrajhi
Acting / Deputy Director General
for Aviation Safety, Air Transport & Aviation Security

CC: Director General of Civil Aviation.
Dy. Dir. Gen. Kuwait. Intel. Airport Affairs.
Dy. Dir. Gen. for Air Navigation Services Affairs.
Safety Management Coordination Center (SMCC).
Head of Technical Office.
Civil Aviation Security Department.
Aviation Safety Director.
Air Transport Director.
Inspection & oversight Superintendent.
Head of Standards & Aviation Safety Regulations Division.

EM 27.8

HRA

Notes on the presentation of the Amendment
Notice Of Proposed Amendment
(NPA)

The text of the amendment is arranged to show deleted text in Red Color and with a line through it, new text to be inserted is in Blue color as shown below:

~~Text to be deleted is in Red and shown with a line through it.~~	**Text to be deleted**
New text to be inserted is in Blue Color.	**New text to be inserted**
~~Text to be deleted is in Red and shown with a line through it~~, followed by the replacement text which is in Blue Color.	**New text to replace existing text**
. . . Indicates that remaining text is unchanged in front or following the reflected amendment.	**Text is unchanged**

Notice Of Safety Regulation Amendment
(NPA, NSRA and Revisions)

Side bar indicates that text is changed or added.

NPA RESPONSE FORM

NPA 2025-20

Please add your comments on the proposal by ticking [✓] the appropriate box below.

Any additional constructive comments, suggested amendments or alternative action will be welcome and may be provided on this response sheet or by separate correspondence.

☐ No comments on the proposal.

☐ Comments on the proposal. (Please provide explanatory comment).

Name:	Organization:
Address/Contact No:	
E-Mail:	
Signature:	Date:

Kuwait Civil Aviation Safety Regulations

KCASR 14 – AERODROMES

Volume II – Aerodromes Heliports

Table of Contents

Amendment Record

Amendment No	Date of Issue	Remarks
1	March 2018	NASR 2018-101 implemanted
2	June 2018	Part Rename
3	Octobar 2018	NPA 2018-41 (Up to ICAO Ammandmant 8)
4	September 2020	Based on NPA 2020-13 - (Updated to ICAO annex 14 – Vol II Ammandmant 9)
5	Oct 2025	Based on NPA 2025-20 - (Updated to ICAO annex 14 – Vol II Ammandmant 10)

Abbreviations and Symbols

Abbreviations

AIP	Aeronautical Information Publication
APAPI	Abbreviated precision approach path indicator
ASPSL	Arrays of segmented point source lighting
Cd	Candela
Cm	Centimetre
DIFFS	Deck integrated firefighting system
FAS	Fixed application system
FATO	Final approach and take-off area
FFAS	Fixed foam application system
FMS	Fixed monitor system
Ft	Foot
GNSS	Global navigation satellite system
HAPI	Helicopter approach path indicator
HFM	Helicopter flight manual (also known as RFM)
Hz	Hertz
IDF	Initial departure fix
Kg	Kilogram
km/h	Kilometre per hour
kt	Knot
L	Litre
Lb	Pounds
LDAH	Landing distance available
L/min	Litre per minute
LOA	Limited obstacle area
LOS	Limited obstacle sector
LP	Luminescent panel
M	Metre
MAPt	Missed approach point
MTOM	Maximum take-off mass
NVIS	Night Vision Imaging Systems (NVIS)
OCS	Obstacle clearance surface
OFS	Obstacle-free sector
OLS	Obstacle limitation surface
PAPI	Precision approach path indicator
PFAS	Portable foam application system
PinS	Point-in-space
PRP	Point-in-space reference point
RFF	Rescue and firefighting
RFFS	Rescue and firefighting service
RFM	Rotorcraft flight manual (also known as HFM)
R/T	Radiotelephony or radio communications
RTODAH	Rejected take-off distance available
S	Second
T	Tonne (1 000 kg)
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available
UCW	Undercarriage width
VSS	Visual segment surface

Chapter 1. General

Note 1.— KCASR 14, Volume II, contains Standards and Recommended Practices (specifications) that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at heliports, and certain facilities and technical services normally provided at a heliport. It is not intended that these specifications limit or regulate the operation of an aircraft.

Note 2.— When designing a heliport, a design helicopter, which represents the largest dimensions; the greatest maximum take-off mass (MTOM); and the most critical obstacle avoidance criteria of the population of helicopters the heliport is intended to serve, is taken into account. For guidance on establishing a design helicopter see the Heliport Manual (Doc 9261).

1.1 Definitions

Part 14, Volume I, contains definitions for the terms which are used in both volumes. Those definitions are not reproduced in this volume, with the exception of the following two, which are included for ease of reference.

The following list contains definitions of terms that are used only in Volume II, with the meanings given below.

Aeronautical Study: A study of an aeronautical problem to identify possible solutions and select a solution that is acceptable to the Kuwait DGCA without degrading safety.

Alternative Means of Compliance: Alternative means of compliance are those that propose an alternative to an existing Acceptable Means of Compliance (AMC) or those that propose new means to establish compliance with the KCASR for which no associated AMC have been adopted by the Kuwait DGCA.

Apron: A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance, including any apron taxiways and aircraft stand taxi lanes.

Apron Management Service: A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

Ascent/Descent surface. An inclined plane or complex surface that slopes upward from the centre of the FATO to indicate the path helicopters are expected to follow when vertical procedures are utilized – it can consist of:

a) an inverted triangle when there is no lateral component; or

b) an inverted conical surface when there is a lateral component.

D: The largest overall dimension of the helicopter when rotor(s) are turning measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane or helicopter structure.

Design D. The D of the design helicopter.

D-value. A limiting dimension, in terms of "D", for a heliport, helideck or shipboard heliport, or for a defined area within.

Declared Distances:

(a) Take-off distance available (TODAH): The length of the FATO plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.

(b) Rejected take-off distance available (RTODAH): The length of the FATO declared available and suitable for helicopters operated in performance class 1 to complete a rejected take-off.

(c) Landing distance available (LDAH): The length of the FATO plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

Dynamic load bearing surface: A surface capable of supporting the loads generated by a helicopter in motion.

Elevated heliport: A heliport located on a raised structure on land.

Elongated. When used with TLOF or FATO, elongated means an area which has a length more than twice its width.

Final approach and take-off area (FATO): A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by helicopters operated in performance class 1, the defined area includes the rejected take-off area available.

Helicopter air taxiway: A defined path on the surface established for the air taxiing of helicopters.

Helicopter clearway: A defined area on the ground or water, selected and/or prepared as a suitable area over which a helicopter operated in performance class 1 may accelerate and achieve a specific height.

Helicopter ground taxiway: A ground taxiway intended for the ground movement of wheeled undercarriage helicopters.

Helicopter stand: A defined area intended to accommodate a helicopter for purposes of: loading or unloading passengers, mail or cargo; fuelling, parking or maintenance; and, where air taxiing operations are contemplated, the TLOF.

Helicopter taxiway: A defined path on a heliport intended for the ground movement of helicopters and that may be combined with an air taxi-route to permit both ground and air taxiing.

Helicopter taxi-route. A defined path established for the movement of helicopters from one part of a heliport to another.

a) *An air taxi-route.* A marked taxi-route intended for air taxiing.

b) *A ground taxi-route.* A taxi-route centred on a taxiway.

Helideck: A heliport located on a fixed or floating offshore facility such as an exploration and/or production unit used for the exploitation of oil or gas.

Heliport: An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Heliport elevation: The elevation of the highest point of the FATO.

Heliport reference point (HRP): The designated location of a heliport.

Initial departure fix (IDF). The terminal fix for the visual segment and the fix where the instrument phase of the PinS departure begins.

Landing Area: That part of a movement area intended for the landing or take-off of aircraft.

Obstacle: All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

(a) are located on an area intended for the surface movement of aircraft; or

(b) extend above a defined surface intended to protect aircraft in flight; or

(c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Initial departure fix (IDF). The terminal fix for the visual segment and the fix where the instrument phase of the PinS departure begins.

Point-in-space approach (PinS): ~~The Point-in-space approach is based on GNSS and is an~~ An approach procedure designed for helicopters only that includes both a visual and an instrument segment.. ~~It is aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles.~~

Point-in-space (PinS) departure. A departure procedure designed for helicopters only that includes both a visual and an instrument segment.

Point-in-space (PinS) reference point (PRP). Reference point for the point-in-space approach as identified by the latitude and longitude of the MAPt.

Point-in-space (PinS) visual segment: ~~This is the~~ The segment of a helicopter PinS ~~approach~~ procedure ~~from the~~ between a point (MAPt or IDF) and heliport. ~~to the landing location for a PinS "proceed visually" procedure. This visual segment connects the Point-in-space (PinS) to the landing location.~~

***Note** — The ~~procedure~~ design criteria for ~~a~~ PinS ~~approach and the detailed design requirements for a visual segment~~ procedures are established in ICAO Procedures for Air Navigation Services — Aircraft Operations, Volume II (PANS-OPS, Doc 8168- Volume II).*

Protection area: A defined area surrounding a stand intended to reduce the risk of damage from helicopters accidentally diverging from the stand.

Rejected take-off area: A defined area on a heliport suitable for helicopters operating in performance class 1 to complete a rejected take-off.

Runway-type FATO: A FATO having characteristics similar in shape to a runway.

Safety area: A defined area on a heliport surrounding the FATO which is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.

Safety Management System (SMS): A system for the management of safety at aerodromes including the organizational structure, responsibilities, procedures, processes and provisions for the implementation of aerodrome safety policies by an aerodrome operator, which provides for the control of safety at, and the safe use of, the aerodrome.

Shipboard heliport: A heliport located on a ship that may be purpose or non-purpose-built. A purpose-built shipboard heliport is one designed specifically for helicopter operations. A non-purpose-built shipboard heliport is one that utilizes an area of the ship that is capable of supporting a helicopter but not designed specifically for that task.

State Safety Programme (SSP): An integrated set of requirements and activities for the management of aviation safety by the State.

Static load-bearing surface: A surface capable of supporting the mass of a helicopter situated upon it.

Surface-level heliport: A heliport located on the ground or on a structure on the surface of the water.

Touchdown and lift-off area (TLOF): An area on which a helicopter may touchdown or lift off.

Touchdown positioning circle (TDPC). A touchdown positioning marking (TDPM) in the form of a circle used for omnidirectional positioning in a TLOF.

Touchdown positioning marking (TDPM). A marking or set of markings providing visual cues for the positioning of helicopters.

Vertical procedures. Take-off and landing procedures that include an initial vertical or steep climb and a final vertical or steep descent profile. The profile may or may not include a lateral component.

Winching area: An area provided for the transfer by helicopter of personnel or stores to or from a ship.

1.2 Applicability

Note.— The dimensions discussed in this KCASR are based on consideration of single-main-rotor helicopters. For tandem-rotor helicopters the heliport design will be based on a case-by-case review of the specific models using the basic requirement for a safety area and protection areas specified in this KCASR. The specifications of the main chapters of this KCASR are applicable for visual heliports that may or may not incorporate the use of a Point-in-space approach or departure. Additional specifications for instrument heliports with non-precision and/or precision approaches and instrument departures are detailed in the Appendix. The specifications of this KCASR are not applicable for water heliports (touchdown or lift-off on the surface of the water).

1.2.1. KCASR 14, Volume II – Aerodrome - Heliports applies to all aerodromes/heliports that are certificated within State of Kuwait. Any aerodrome/heliport within State of Kuwait may apply for Certification under these requirements.

1.2.2. These regulations represent the minimum requirements to achieve an acceptable level of safety performance.

1.3 Purpose

1.3.1. This KCASR Part 14 Volume II provides regulations that are primarily based upon the Standards and Recommended Practices (SARPs) of ICAO Annex 14 Volume II, Heliports, as well as those of ICAO Annex 15 and other related ICAO documents.

1.3.2. The issue of a certificate, licence or approval indicates only that the holder is considered competent to secure the safe operation of a Heliport. The possession of such a certificate, licence or approval does not relieve the heliport operator from the responsibility for compliance with KCASR 14, Volume II – Aerodrome - Heliports and any other legislation in force. Neither does it relieve the Heliport operator of its responsibility for oversight of any service provider contracted to meet the requirements imposed upon service providers.

1.3.3. In addition, KCASR 14, Volume II – Aerodrome - Heliports includes material and specifications to support the safety oversight activities by the Kuwait DGCA and to provide guidance to heliport operators on the physical characteristics of a heliport or helideck, the operational requirements and the infrastructure that is required to be provided. Where appropriate, reference is made to other documents in support of

KCASR 14, Volume II – Aerodrome - Heliports. This material can be used to establish minimum acceptable standards or Acceptable Means of Compliance (AMC) under the discretion of the Kuwait DGCA.

1.4 Certification of heliports (Applicable as of 26 November 2026)

Note.— *The intent of these specifications is to ensure the establishment of a regulatory regime so that compliance with the specifications in this Annex can be effectively enforced. It is recognized that the methods of ownership, operation and surveillance of heliports differ among States. The most effective and transparent means of ensuring compliance with applicable specifications is the availability of a separate safety oversight entity and a well-defined safety oversight mechanism with support of appropriate legislation to be able to carry out the function of safety regulation of heliports. When a heliport is granted a certificate, it signifies to aircraft operators and other organizations operating on the heliport that, at the time of certification, the heliport meets the specifications regarding the facility and its operation, and that it has, according to the certifying authority, the capability to maintain these specifications for the period of validity of the certificate. The certification process also establishes the baseline for continued monitoring of compliance with the specifications. Information on the status of certification of heliports would need to be provided to the appropriate aeronautical information services for promulgation in the Aeronautical Information Publication (AIP). See 2.6.1 and the PANS-AIM (Doc 10066), Appendix 2, AD 1.5 (1).*

1.4.1 Kuwait DGCA/ASD shall certify heliports used for international operations in accordance with the specifications contained in this Part as well as other relevant ICAO specifications through an appropriate regulatory framework.

Note 1.— *In addition to certifying heliports intended to be used by helicopters in international civil aviation, certifying heliports that are open to public use is deemed also to be beneficial for the safety, regularity and efficiency of these operations.*

Note 2.— *Guidance on heliport certification, including the interrelations between the aerodrome and heliport certification processes in case of co-location on an aerodrome, can be found in the Heliport Manual (Doc 9261).*

1.4.2 The regulatory framework shall include the establishment of criteria and procedures for the certification of heliports.

Note.— *Guidance on a regulatory framework is given in the Heliport Manual (Doc 9261).*

1.4.3 As part of the certification process, Kuwait DGCA/ASD shall ensure that a heliport manual which will include all pertinent information on the heliport site, facilities, services, equipment, operating procedures, organization and management including a safety management system (SMS), is submitted by the applicant for approval/acceptance prior to granting the heliport certificate.

Note 1.— *Guidance on the contents of a heliport manual, including procedures for its submission and approval/acceptance, verification of compliance and granting of a heliport certificate, can be found in the Heliport Manual (Doc 9261).*

Note 2*.— Annex 19 — Safety Management contains SMS provisions applicable to certified heliports. Overarching guidance on SMS is contained in the Safety Management Manual (Doc 9859) with sector-specific guidance found in the Heliport Manual (Doc 9261).*

1.54 ICAO Annex 14 compliance

1.54.1. Except as provided in this paragraph, the operator of a certificated heliport shall comply with the regulations contained in KCASR 14, Volume II – Aerodrome - Heliports. Where there is a difference between KCASR 14, Volume II – Aerodrome - Heliports and ICAO SARPs, the heliport operator shall comply with the more stringent provision. (See Appendix 4 for compliance statement).

1.54.2. An alternative means of compliance to that specified in this KCASR Part 14 Volume II, Heliports may be proposed through the submission to the Kuwait DGCA of an aeronautical study. An aeronautical study is a study of an aeronautical problem to

identify possible solutions and select a solution that is acceptable without degrading safety. An aeronautical study shall:

(a) assess the impact of a proposed deviation from the requirements;

(b) present alternative means of ensuring the safety of aircraft operations; and

(c) estimate the effectiveness of each alternative and to recommend procedures to compensate for the deviation.

1.54.3. Any agreement or contract between a heliport operator and any service provider or sub-contractor providing services to the heliport operator shall include the specific requirement for compliance with KCASR 14, Volume II – Aerodrome - Heliports as appropriate.

1.65 Exemptions

1.65.1. The Kuwait DGCA may exempt, in writing, a heliport operator from complying with specific provisions of these requirements. However, before the Kuwait DGCA decides to exempt the heliport operator, the Kuwait DGCA must take into account all safety-related aspects.

1.65.2. An exemption is subject to the heliport operator complying with the conditions and procedures specified by the Kuwait DGCA in any heliport certificate, licence or approval as being necessary in the interest of safety.

1.65.3. When a heliport does not meet the requirement of a standard or practice specified in a requirement, the Kuwait DGCA may determine, after reviewing the submitted aeronautical study, only if and where permitted by the standards and practices, the alternative conditions and procedures that are necessary to ensure a level of safety equivalent to that established by the relevant standard or practice.

1.65.4. Any accepted deviation from a standard or practice and conditions and procedures referred to shall be set out in an endorsement to any certificate, licence or approval.

Common reference systems

1.76.1. **Horizontal reference system**

World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system. Reported aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

***Note** — Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84), Manual (ICAO Doc 9674).*

1.76.2. **Vertical reference system**

Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system.

***Note 1** — The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.*

***Note 2** — Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.*

1.76.3. **Temporal reference system**

1.76.3.1 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

1.76.3.2 When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

Chapter 2. Heliport data

~~1.1~~2.1 Aeronautical data

2.1.1 Determination and reporting of heliport-related aeronautical data shall be in accordance with the accuracy and integrity classification required to meet the needs of the end-user of aeronautical data

Note — Specifications concerning the accuracy and integrity classification related to heliport related aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1

2.1.2 Digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital data sets.

Note .— Detailed specifications concerning digital data error detection techniques are contained in PANS-AIM (Doc 10066).

2.2. Heliport reference point

2.2.1. A heliport reference point shall be established for a heliport not collocated with an aerodrome.

***Note** — When the heliport is collocated with an aerodrome, the established aerodrome reference point serves both aerodrome and heliport.*

2.2.2. The heliport reference point shall be located near the initial or planned geometric centre of the heliport and shall normally remain where first established.

2.2.3. The position of the heliport reference point shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

2.3. Heliport elevations

2.3.1. The heliport elevation and geoid undulation at the heliport elevation position shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre or foot.

2.3.2. The elevation of the TLOF and/or the elevation and geoid undulation of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre or foot.

***Note** — Geoid undulation must be measured in accordance with the appropriate system of coordinates.*

2.4. Heliport dimensions and related information

2.4.1. The following data shall be measured or described, as appropriate, for each facility provided on a heliport:

(a) heliport type — surface-level, elevated, shipboard or helideck;

(b) TLOF — dimensions to the nearest metre or foot, slope, surface type, bearing strength in tonnes (1 000 kg);

(c) FATO — type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length and width to the nearest metre or foot, slope, surface type;

(d) safety area — length, width and surface type;

(e) helicopter taxiway and helicopter taxi route— designation, width, surface type;

(f) apron — surface type, helicopter stands;

(g) approach surface — when elevated, the height of the inner edge above the FATO;

Note.— *When the take-off climb surface is elevated, its inner edge and height will be the outer edge of the elevated helicopter clearway as specified in 4.1.14.*

(h) helicopter clearway — length, ground profile; or, when elevated, height above the FATO, length and width; and

(i) visual aids for approach procedures, marking and lighting of FATO, TLOF, helicopter ground taxiways, helicopter air taxiways and helicopter stands.

2.4.2. The geographical coordinates of the geometric centre of the TLOF and/or of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

2.4.3. The geographical coordinates of appropriate centre line points of helicopter taxiways and helicopter taxi routes shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

2.4.4. The geographical coordinates of each helicopter stand shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

2.4.5. The geographical coordinates of obstacles in Area 2 (the part within the heliport boundary) and in Area 3 shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported to the aeronautical information services authority.

Note *— PANS-AIM (Doc 10066) Appendix 8 provides requirements for obstacle data determination in Areas 2 and 3.*

2.5. Declared distances

The following distances to the nearest metre or foot shall be declared, where relevant, for a heliport:

(a) take-off distance available;

(b) rejected take-off distance available; and

(c) landing distance available.

2.6. Coordination between aeronautical information services and heliport authorities

2.6.1. To ensure that aeronautical information services units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between aeronautical information services and heliport authorities responsible for heliport services to report to the responsible aeronautical information services unit, with a minimum of delay:

(a) information on the status of certification of heliports and information on heliport conditions;

(b) the operational status of associated facilities, services and navigation aids within their area of responsibility;

(c) any other information considered to be of operational significance.

2.6.2. Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issue of relevant material for promulgation. To ensure timely provision of the information to the aeronautical information service, close coordination between those services concerned is therefore required.

2.6.3. Of a particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the Aeronautical Information Regulation and control (AIRAC) system, as specified in ICAO Annex 15, Chapter 6. The predetermined, internationally agreed AIRAC effective dates shall be observed by the responsible heliport services when submitting the raw information/data to aeronautical information services.

Note.— Detailed specifications concerning the AIRAC system are contained in ICAO PANS-AIM (Doc 10066), Chapter 6.

2.6.4. The heliport services responsible for the provision of raw aeronautical information/data to the aeronautical information services shall do that while taking into account accuracy and integrity requirements required to meet the needs of the end-user of aeronautical data.

Note 1.— *Specifications concerning the accuracy and integrity classification of heliport-related aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1.*

Note 2 *— Specifications for the issue of a NOTAM and SNOWTAM are contained in ICAO Annex 15, Chapter 6, PANS-AIM (Doc 10066), and Appendices 3 and 4, respectively.*

Note 3 *— The AIRAC information is distributed by the AIS at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.*

Note 4 *— The schedule of the predetermined internationally agreed AIRAC common effective dates at intervals of 28 days and guidance for the AIRAC use are contained in ICAO Aeronautical Information Services Manual (Doc 8126, Chapter 2, 2.6).*

2.7 Rescue and firefighting

Note.— *See 6.2 for information on rescue and firefighting services.*

2.7.1 Information concerning the level of protection provided at a heliport for helicopter rescue and firefighting purposes shall be made available.

2.7.2 The level of protection normally available at a heliport shall be expressed in terms of the category of the rescue and firefighting service as described in 6.2 and in accordance with the types and amounts of extinguishing agents normally available at the heliport.

Helicopter clearways

Note.— The inclusion of detailed specifications for helicopter clearways in this section is not intended to imply that a clearway has to be provided.

3.1.16 A helicopter clearway shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of the design helicopter when it is accelerating in level flight, and close to the surface, to achieve its safe climbing speed; and

b) when solid, a surface which: is contiguous and flush with the FATO and safety area.; is resistant to the effects of rotor downwash; and is free of hazards if a forced landing beis required; or.

c) when elevated, clearance above all obstacles.

3.1.17 When a helicopter clearway is provided, the inner edgeit shall be located: beyond the end of the FATO.

a) at the outer edge of the safety area; or

b) when elevated, directly above, or directly below, the outer edge of the safety area.

Note.— *Guidance on designing a clearway that is below the FATO of an elevated heliport/helideck is provided in Heliport Manual (Doc 9261).*

3.1.173.1.18 The width of a helicopter clearway shall not be less than the width of the FATO and associated safety area. (See Figure 3-1.)

3.1.183.1.19 When solid, the ground in a helicopter clearway shall not project above a plane having an overall upward slope of 3 per centor having a local upward slope exceeding 5 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

3.1.193.1.20 An object situated in a helicopter clearway, which may endanger helicopters in the air, shall be regarded as an obstacle and should be removed.

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Touchdown and lift-off areas

3.1.203.1.21 A TLOF shall:

a) provide:

1) an area free of obstacles and of sufficient size and shape to ensure containment of the undercarriage of the most demanding helicopter the TLOF is intended to serve in accordance with the intended orientation;

2) a surface which:

i) has sufficient bearing strength to accommodate the dynamic loads associated with the anticipated type of arrival of the helicopter at the designated TLOF;

ii) is free of irregularities that would adversely affect the touchdown or lift-off of helicopters;

iii) has sufficient friction to avoid skidding of helicopters or slipping of persons;

iv) is resistant to the effects of rotor downwash; and

v) ensures effective drainage while having no adverse effect on the control or stability of a helicopter during touchdown and lift-off, or when stationary; and

b) be associated with a FATO or a stand.

~~3.1.21~~3.1.22 A heliport shall be providedwith at least one TLOF.

~~3.1.22~~3.1.23 A TLOF shall be provided whenever it is intended that the undercarriage of the helicopter will touch down within a FATO or stand, or lift off from a FATO or stand.

~~3.1.23~~3.1.24 The minimum dimensions of a TLOF shall be:

a) when in a FATO intended to be used by helicopters operated in performance class 1, the dimensions for the required procedure prescribed in the helicopter flight manuals (HFMs) of the helicopters for which the TLOF is intended; and

b) when in a FATO intended to be used by helicopters operated in performance classes 2 or 3, or in a stand:

1) when there is no limitation on the direction of touchdown, of sufficient size to contain a circle of diameter of at least 0.83 D of:

i) in a FATO, the design helicopter; or

ii) in a stand, the largest helicopter the stand is intended to serve;

2) when there is a limitation on the direction of touchdown, of sufficient width to meet the requirement of 3.1.21 a) 1) above but not less than twice the undercarriage width (UCW) of:

i) in a FATO, the design helicopter; or,

ii) in a stand, the most demanding helicopter the stand is intended to serve.

~~3.1.24~~3.1.25 For an elevated heliport, the minimum dimensions of a TLOF, when in a FATO, shall be of sufficient size to contain a circle of diameter of at least 1 Design-D.

~~3.1.25~~3.1.26 Slopes on a TLOF shall not:

a) except as provided in b) or c) below; exceed 2 per cent in any direction;

b) when the TLOF is elongated and intended to be used by helicopters operated in performance class 1; exceed 3 per cent overall, or have a local slope exceeding 5 per cent; and

c) when the TLOF is elongated and intended to be used solely by helicopters operated in performance class 2 or 3, exceed 3 per cent overall, or have a local slope exceeding 7 per cent.

~~3.1.26~~3.1.27 When a TLOF is within a FATO it should be:

a) centred on the FATO; or

b) for an elongated FATO, centred on the longitudinal axis of the FATO.

3.1.28 When a TLOF is within a helicopter stand, it shall be centred on the stand.

1. 3.1.29 A TLOF shall be provided with markings which clearly indicate the touchdown position and, by their form, any limitations on manoeuvring.

2. *Note.— When a TLOF in a FATO is larger than the minimum dimensions, the TDPM may be offset while ensuring containment of the undercarriage within the TLOF and the helicopter within the FATO.*

3. 3.1.30 Where an elongated Performance Class 1 FATO/TLOF contains more than one TDPM, measures shall be in place to ensure that only one can be used at a time.

i) is free of hazards if a forced landing is required.

~~3.1.36~~3.1.37 No mobile object shall be permitted on a taxi-route during helicopteroperations.

Note.— See ICAO Heliport Manual (Doc 9261) for further guidance.

~~3.1.37~~3.1.38 When solid and collocated with a taxiway, the taxi-route should not exceed an upward transverse slope of 4 per cent outwards from the edge of the taxiway.When solid and collocated with a taxiway, the taxi-route should not exceed an upward transverse slope of 4 per cent outwards from the edge of the taxiway.

Helicopter ground taxi-routes

~~3.1.38~~3.1.39 A helicopter ground taxi-route shall have a minimum width of 1.5 x the overall width of the largest helicopter it is intended to serve, and be centred on a taxiway.

~~3.1.39~~3.1.40 Essential objects located in a helicopter ground taxi-route shall not:

a) be located at a distance of less than 50 cm outwards from the edge of the helicopter ground taxiway; and

b) penetrate a surface originating 50 cm outwards of the edge of the helicopter taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

Helicopter air taxi-routes

***Note** — A helicopter air taxi-route is intended to permit the movement of a helicopter above the surface at a height normally associated with ground effect and at ground speed less than 37km/h (20 kt).*

~~3.1.40~~3.1.41 A helicopter air taxi-route shall have a minimum width of twice the overall width of the largest helicopter it is intended to serve.

~~3.1.41~~3.1.42 If collocated with a taxiway for the purpose of permitting both ground and air taxi operations (see Figure 3.4):

a) the helicopter air taxi-route shall be centred on the taxiway; and

b) essential objects located in the helicopter air taxi-route shall not:

1) be located at a distance of less than 50 cm outwards from the edge of the helicopter taxiway; and

2) penetrate a surface originating 50 cm outwards of the edge of the helicopter taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.The slopes of the surface of a helicopter air taxiway should not exceed the slope landing limitations of the helicopters the helicopter air taxiway is intended to serve. In any event the transverse slope should not exceed 10 per cent and the longitudinal slope should not exceed 7 per cent.

~~3.1.42~~3.1.43 When not collocated with a taxiway, Tthe slopes of the surface of a helicopter air taxiway an air taxi-route shall not exceed the slope landing limitations of the helicopters the helicopter air taxiway the taxi-route is intended to serve. In any event, the transverse slope shall not exceed 10 per cent and the longitudinal slope shall not exceed 7 per cent.

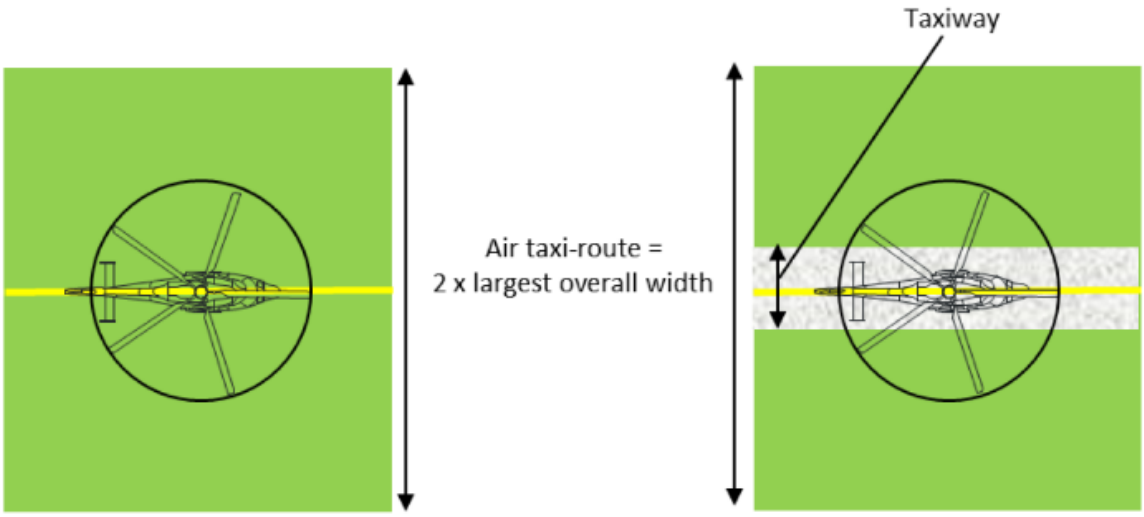


Figure 3-4 - Helicopter air taxi-route and combined air taxi-route/taxiway

Helicopter stands

Note *— The provisions of this section do not specify the location for helicopter stands but allow a high degree of flexibility in the overall design of the heliport. However, it is not considered good practice to locate helicopter stands under a flight path. See ICAO Heliport Manual (Doc 9261) for further guidance.*

~~3.1.43~~3.1.44 3.1 A helicopter stand shall:

a) provide:

1) an area free of obstacles and of sufficient size and shape to ensure containment of every part of the largest helicopter the stand is intended to serve when it is being positioned within the stand;

2) a surface which:

i) is resistant to the effects of rotor downwash;

ii) is free of irregularities that would adversely affect the manoeuvring of helicopters;

iii) has bearing strength capable of withstanding the intended loads;

iv) has sufficient friction to avoid skidding of helicopters or slipping of persons; and

v) ensures effective drainage while having no adverse effect on the control or stability of a wheeled helicopter when being manoeuvred under its own power, or when stationary; and

b) be associated with a protection area.

~~3.1.44~~3.1.45 The minimum dimensions of a helicopter stand shall be:

a) a circle of diameter of 1.2 D of the largest helicopter the stand is intended to serve; or

b) when there is a limitation on manoeuvring and positioning, of sufficient width to meet the requirement of 3.1.44 a) 1) above but not less 1.2 times overall width of largest helicopter the stand is intended to serve.

Note 1.— For a helicopter stand intended to be used for taxi-through only, a width less than 1.2D but which provides containment and still permits all required functions of a stand to be performed, might be used (in accordance with 3.1.44 a) 1)).

Note 2.— For a helicopter stand intended to be used for turning on the ground, the minimum dimensions may be influenced by the turning circle data provided by the manufacturer and are likely to exceed 1.2 D. See the Heliport Manual (Doc 9261) for further guidance.

~~3.1.45~~3.1.46 The mean slope of a helicopter stand in any direction shall not exceed 2 per cent.

~~3.1.46~~3.1.47 Each helicopter stand shall be provided with positioning markings to clearly indicate where the helicopter is to be positioned and, by their form, any limitations on manoeuvring.

~~3.1.47~~3.1.48 A stand shall be surrounded by a protection area which need not be solid.

Protection areas

~~3.1.48~~3.1.49 3.1.49 A protection area shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it; and

b) when solid, a surface which is contiguous and flush with the stand; is resistant to the effects of rotor downwash; and ensures effective drainage.

~~3.1.49~~3.1.50 When associated with a stand designed for turning, the protection area shall extend outwards from the periphery of the stand for a distance of 0.4D. (See Figure 3.5).

~~3.1.50~~3.1.51 When associated with a stand designed for taxi-through, the minimum width of the stand and protection area shall not be less than the width of the associated taxi-route (see Figures 3.6 and 3.7).

~~3.1.51~~3.1.52 When associated with a stand designed for non-simultaneous use (see Figures 3.8 and 3.9):

a) the protection area of adjacent stands may overlap but shall not be less than the required protection area for the larger of the adjacent stands; and

b) the adjacent non-active stand may contain a static object but it shall be wholly within the boundary of the stand.

Note.— To ensure that only one of the adjacent stands is active at a time, instruction to pilots in the AIP make clear that a limitation on the use of the stands is in force.

~~3.1.52~~3.1.53 No mobile object shall be permitted in a protection area during helicopter operations.

~~3.1.53~~3.1.54 Essential objects located in the protection area shall not:

(a) if located at a distance of less than 0.75 D from the centre of the helicopter stand, penetrate a plane at a height of 5 cm above the plane of the central zone; and

(b) if located at a distance of 0.75 D or more from the centre of the helicopter stand, penetrate a plane at a height of 25 cm above the plane of the central zone and sloping upwards and outwards at a gradient of 5 per cent.

3.~~3~~2. Helidecks

Note *— The following specifications are for helidecks located on structures engaged in such activities as mineral exploitation, research or construction. See 3.4 for shipboard heliport provisions.*

Final approach and take-off areas and touchdown and lift-off areas

Note 1 *— For helidecks that have a 1 D or larger FATO it is presumed that the FATO and the TLOF will always occupy the same space and have the same load bearing characteristics so as to be coincidental. For helidecks that are less than 1 D, the reduction in size is only applied to the TLOF which is a load bearing area. In this case, the FATO remains at 1 D but the portion extending beyond the TLOF perimeter need not be load bearing for helicopters. The TLOF and the FATO may be assumed to be collocated.*

Note 2 *— Guidance on the effects of airflow direction and turbulence, prevailing wind velocity and high temperatures from gas turbine exhausts or flare-radiated heat on the location of the FATO is given in ICAO Heliport Manual (Doc 9261).*

Note 3 — *Guidance on the design and markings for helideck parking areas is given in the* Heliport Manual *(Doc 9261)*.

3.~~3~~2.1. The specifications in paragraphs 3.2~~3~~.14 and 3.2~~3~~.15 shall be applicable for helidecks completed on or after 1 January 2012.

3.~~3~~2.2. A helideck shall be provided with one FATO and one coincident or collocated TLOF.

3.~~3~~2.3. A FATO may be any shape but shall be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1 D of the largest helicopter the helideck is intended to serve.

3.~~3~~2.4. A TLOF may be any shape but, subject to an appropriate risk assessment, shall be of sufficient size to contain:

~~(a) for helicopters with an MTOM of more than 3175 kg, an area within which can be accommodated a circle of diameter not less than 1 D of the largest helicopter the helideck is intended to serve; and~~

~~for helicopters with an MTOM of 3175 kg or less,~~ an area within which can be accommodated a circle of diameter not less than 0.83 D of the largest helicopter the helideck is intended to serve.

Note.— *Further guidance on factors to inform the risk assessment are given in the Heliport Manual (Doc 9261).*

3.~~3~~2.5. ~~For helicopters with a MTOM of 3175 kg or less, the~~ The TLOF should be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1 D of the largest helicopter the helideck is intended to serve.

3.~~3~~2.6. A helideck shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO.

Note *— Specific guidance on the characteristics of an air-gap is given in ICAO Heliport Manual (Doc 9261). As a general rule, except for shallow superstructures of three stories or less, a sufficient air-gap will be at least 3 m.*

3.~~3~~2.7. *The FATO should be located so as to avoid, as far as is practicable, the influence of environmental effects, including turbulence, over the FATO, which could have an adverse impact on helicopter operations.*

3.~~3~~2.8. The TLOF shall be dynamic load-bearing.

3.~~3~~2.9. The TLOF shall provide ground effect.

3.~~3~~2.10. No fixed object shall be permitted around the edge of the TLOF except for ~~frangible~~ objects, which, because of their function, must be located thereon.

3.~~3~~2.11. For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle- free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25 cm.

3.~~3~~2.12 For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF should be as low as possible and in any case not exceed a height of 15 cm.

3.~~3~~2.13. For any TLOF designed for use by helicopters having a D-value of 16.0 m or less, and any TLOF having dimensions of less than 1D, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5 cm.

Note *— Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.*

3.~~3~~2.14. Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

Note *— Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.*

3.~~3~~2.15. Safety devices such as safety nets or safety shelves shall be located around the edge of a helideck but shall not exceed the height of the TLOF.

3.~~3~~2.16. The surface of the TLOF shall be skid-resistant to both helicopters and persons and be sloped to prevent pooling of water.

Note *— Guidance on rendering the surface of the TLOF skid-resistant is contained in ICAO Heliport Manual (Doc 9261).*

3.~~4~~3. Shipboard heliports

3.~~4~~3.1. The specifications in paragraph 3.4.16 and 3.4.17 shall be applicable to shipboard heliports completed on or after 1 January 2012 and 1 January 2015, respectively.

3.~~4~~3.2. When helicopter operating areas are provided in the bow or stern of a ship or are purpose-built above the ship's structure, they shall be regarded as purpose-built shipboard heliports.

Final approach and take-off areas and touchdown and lift-off areas

Note *— Except for the arrangement described in 3.4.8 b), for shipboard heliports it is presumed that the FATO and the TLOF will be coincidental. Guidance on the effects of airflow direction and turbulence, prevailing wind velocity and high temperature from gas turbine exhausts or flare-radiated heat on the location of the FATO is given in ICAO Heliport Manual (Doc 9261).*

3.~~4~~3.3. A shipboard heliport shall be provided with one FATO and one coincidental or collocated TLOF.

3.~~4~~3.4. A FATO may be any shape but shall be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1 D of the largest helicopter the heliport is intended to serve.

3.34.5. The TLOF of a shipboard heliport shall be dynamic load-bearing.

3.34.6. The TLOF of a shipboard heliport shall provide ground effect.

3.34.7. For purpose-built shipboard heliports provided in a location other than the bow or stern, the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve.

3.34.8. For purpose-built shipboard heliports provided in the bow or stern of a ship, the TLOF shall be of sufficient size to:

(a) contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve; or

(b) for operations with limited touchdown directions, contain an area within which can be accommodated two opposing arcs of a circle with a diameter of not less than 1 D in the helicopter's longitudinal direction. The minimum width of the heliport shall be not less than 0.83 D. (See Figure 7.)

Note 1 *— The ship will need to be manoeuvred to ensure that the relative wind is appropriate to the direction of the helicopter touchdown heading.*

Note 2 *— The touchdown heading of the helicopter is limited to the angular distance subtended by the 1 D arc headings, minus the angular distance which corresponds to 15 degrees at each end of the arc.*

3.43.9. For non-purpose-built shipboard heliports, the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve.

3.34.10. A shipboard heliport shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO.

Note *— Specific guidance on the characteristics of an air-gap is given in ICAO Heliport Manual (Doc 9261). As a general rule, except for shallow superstructures of three stories or less, a sufficient air-gap will be at least 3 m.*

3.34.11. *The FATO should be located so as to avoid, as far as is practicable, the influence of environmental effects, including turbulence, over the FATO, which could have an adverse impact on helicopter operations.*

3.34.12. No fixed object shall be permitted around the edge of the TLOF except for ~~frangible~~ objects, which, because of their function, must be located thereon.

3.34.13. For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle- free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25 cm.

3.34.14 For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF should be as low as possible and in any case not exceed a height of 15 cm.

3.34.15 For any TLOF designed for use by helicopters having a D-value of 16.0 m or less, and any TLOF having dimensions of less than 1D, objects in the obstacle-free sector, whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5 cm.

Note *— Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.*

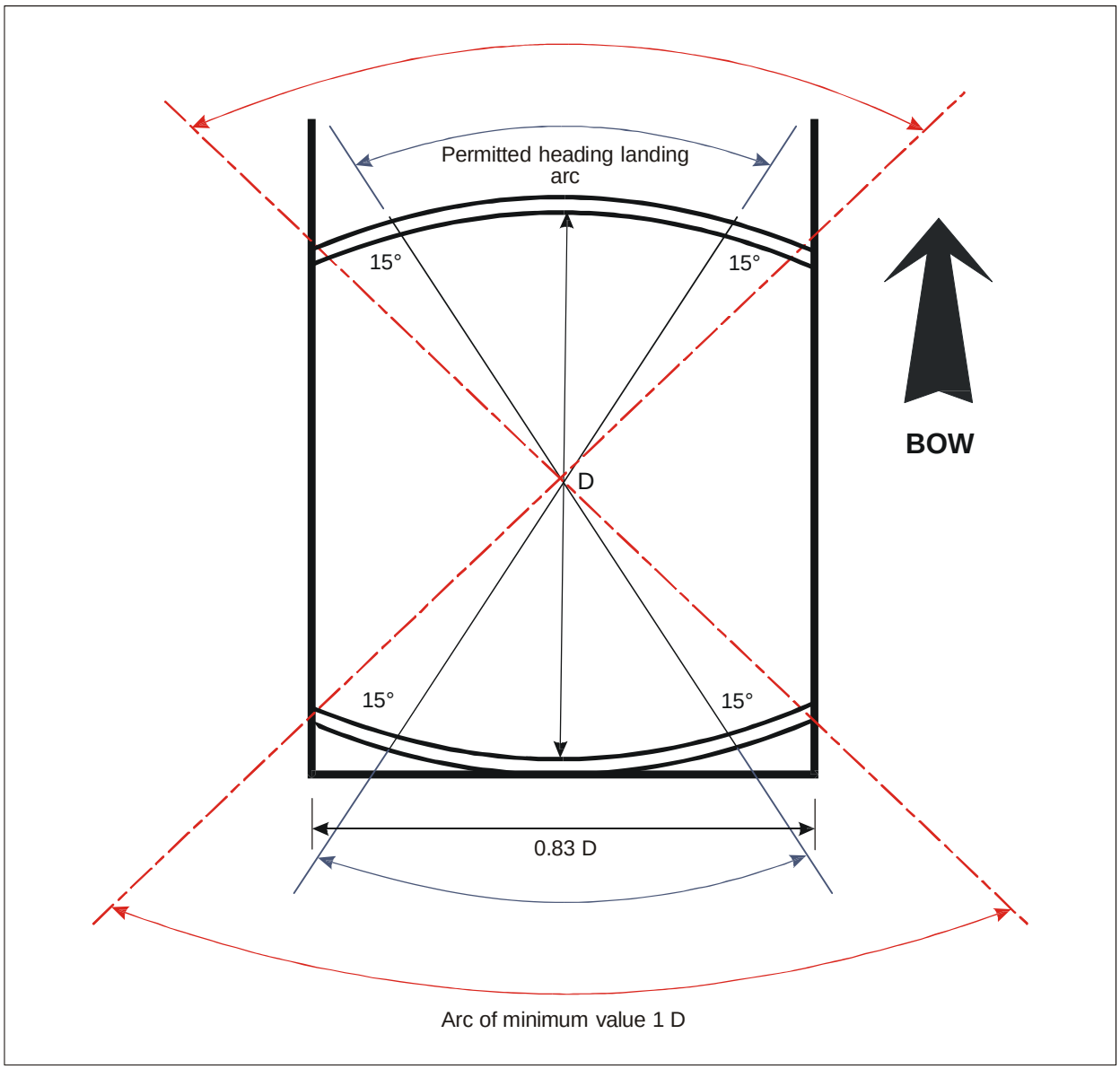


Figure 7 – Shipboard permitted landing headings for limited heading operations
(ICAO Annex 14, Vol.II, Fig. 3-7)

3.34.16. Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

3.34.17. Safety devices such as safety nets or safety shelves shall be located around the edge of a shipboard heliport, except where structural protection exists, but shall not exceed the height of the TLOF.

3.34.18. The surface of the TLOF shall be skid-resistant to both helicopters and persons.

Chapter 4. Obstacle Environment

***Note** — The objectives of the specifications in this chapter are to describe the airspace around heliports so as to permit intended helicopter operations to be conducted safely and to prevent, where appropriate State controls exist, heliports from becoming unusable by the growth of obstacles around them. This is achieved by establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace.*

4.1. Obstacle limitation surfaces and sectors

***Note 1.—** A full description, detailed explanation and visual depiction of the obstacle limitation surfaces and sectors is provided in the Heliport Manual (Doc 9261).*

***Note 2.—** For guidance on the provision of vertical procedures, see the Heliport Manual (Doc 9261).*

***Note 3.—** For guidance on the provision of elevated helicopter clearways and elevated surfaces, see the Heliport Manual (Doc 9261).*

***Note 4.—** See Table 4-1 for dimensions and slopes of surfaces.*

Approach surface

4.1.1. Description:

An inclined plane or a combination of planes or, when a turn or turns areis involved, a complex surface sloping upwards from the inner edgeend of the safety area and centred on a line passing through the centre of the FATO.

~~***Note** — See Figures 8, 9, 10 & 11 for depiction of surfaces. See Table 2 for dimensions and slopes of surfaces.*~~

~~4.1.3.~~4.1.2. Characteristics:

The limits of an approach surface shall comprise:

(a) an inner edge, horizontal and perpendicular to the centre line of the approach surface, with a minimum width equal ~~in length~~ to the ~~minimum~~ specified width/diameter of the FATO plus the safety area, ~~perpendicular to the centre line of the approach surface~~ and located at

1) the outer edge of the safety area; or

2) when vertical procedures are being utilized, directly above the outer edge of the safety area.

(b) two side edges originating at the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and:

(c) an outer edge horizontal and perpendicular to the centre line of the approach surface ~~and~~ at; ~~a specified~~

1) height of 152 m (500 ft) above the elevation of the FATO; ~~.~~ Or

2) when a PinS approach procedure with proceed visually instruction is defined, a specified height above the elevation of the FATO.

4.1.3. The elevation of the inner edge shall be;

a) ~~the~~ The elevation of the FATO at the point on the inner edge that is intersected by the centre line of the approach surface; or ~~. For heliports intended to be used by helicopters operated in performance class 1 and when~~

~~approved by an appropriate authority, the origin of the inclined plane may be raised directly above the FATO.~~

b) when vertical procedures are being utilized; the level at which obstacle clearance is achieved.

4.1.4. The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the surface.

4.1.5. In the case of an approach surface involving a turn or turns, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope of the centre line shall be the same as that for a straight approach surface.

Note *— See Figure 4-1 ~~12.~~, For guidance on construction of turns in approach or take-off climb surfaces see the Heliport Manual (Doc 9261).*

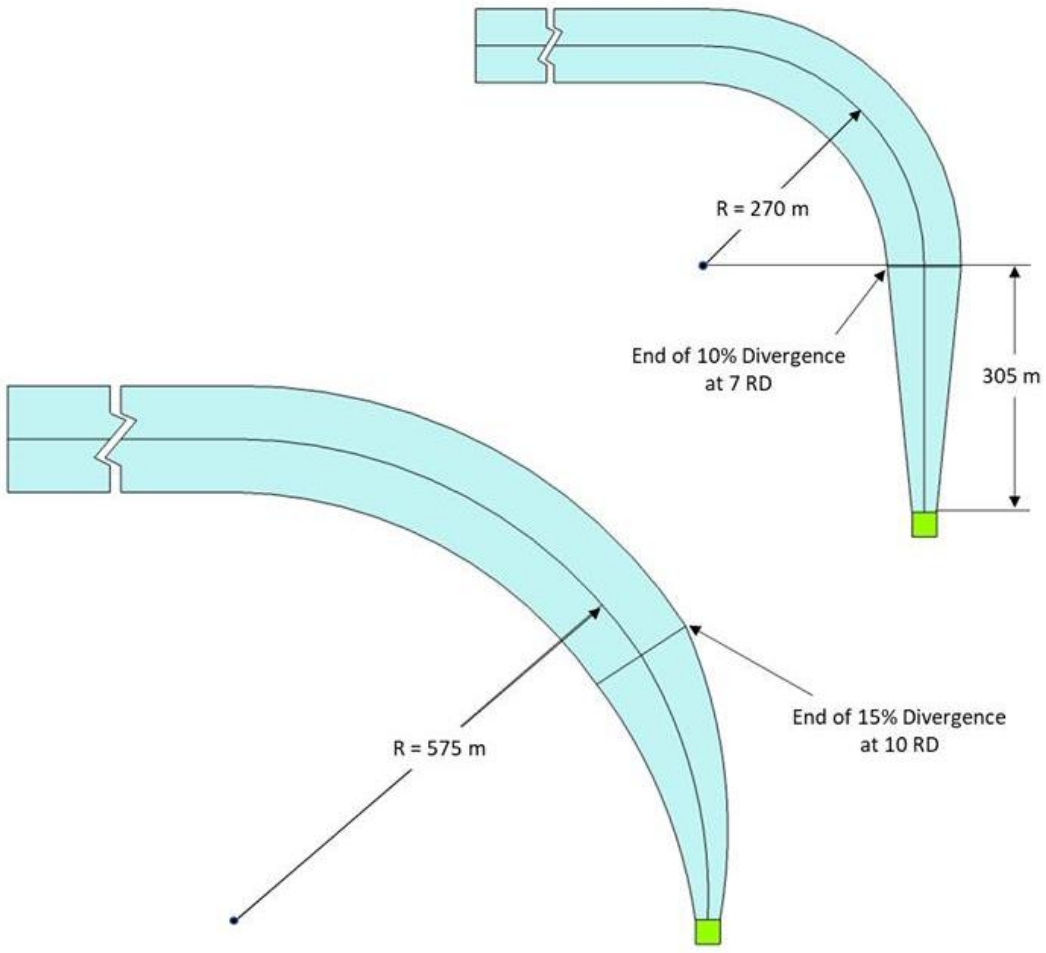


Figure 4-1. Curved approach and take-off climb surface for all FATOs

~~4.1.6. In the case of an approach surface involving a turn, the surface shall not contain more than one curved portion.~~

4.1.6. Where a curved portion of an approach surface is provided, the sum of the radius of arc defining the centre line of the approach surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

4.1.7 Any variation in the direction of the centre line of an approach surface shall be designed so as not to necessitate a turn radius less than 270 m.

***Note** — For heliports intended to be used by helicopters operated in performance class 2 and 3, it is good practice for the approach paths to be selected so as to permit safe forced landing or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimised. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.*

Transitional surface

4.1.8. Description: A complex surface along the side of the safety area and helicopter clearway, when provided, and part of the side of the approach or take-off climb surface, that slopes upwards and outwards to a predetermined height.

4.1.9. Characteristics: The limits of a transitional surface shall comprise:

(a) a lower edge beginning at a point on the side of the approach or take-off climb surface at a specified height above the lower edge extending down the side of the approach or take-off climb surface to the inner edge and from there along the length of the side of the helicopter clearway, when provided, and safety area, parallel to the centre line of the FATO; and

(b) an upper edge located at:

1) 45 m (150 ft) above the FATO; or

2) when vertical procedures are being utilized; 15 m (50 ft) above the elevation of the upper edge of the ascent/descent surface.

4.1.10 The elevation of a point on the lower edge shall be:

(a) along the side of the approach or take-off climb surface — equal to the elevation of the approach or take-off climb surface at that point; then

(b) if provided, along the helicopter clearway – equal to the elevation of the helicopter clearway; and

(c) along the safety area — equal to the elevation of the FATO.

4.1.11 The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the FATO.

Take-off climb surface

4.1.12 Description. An inclined plane, a combination of planes or, when a turn or turns are involved, a complex surface sloping upwards from the end of the safety area, or of the helicopter clearway, when provided, and centred on a line passing through the centre of the FATO.

4.1.13 Characteristics. The limits of a take-off climb surface shall comprise:

(a) an inner edge, horizontal and perpendicular to the centre line of the take-off climb surface, with a minimum width of the width/diameter of:

1) when located at the outer edge of the safety area or helicopter clearway, the FATO plus the safety area; or

2) when located at the outer edge of the elevated helicopter clearway, the elevated helicopter clearway.

(b) two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and

(c) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface:

1) a height of 152 m (500 ft) above the elevation of the FATO; or

2) when a PinS departure procedure with proceed visually instruction is defined, a specified height above the elevation of the FATO.

4.1.14 The elevation of the inner edge shall be:

a) the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the take-off climb surface; or.

b) when located at the outer edge of the helicopter clearway, the elevation of the helicopter clearway.

4.1.15 In the case of a straight take-off climb surface, the slope shall be measured in the vertical plane containing the centre line of the surface

4.1.16 In the case of a take-off climb surface involving a turn or turns, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope of the centre line shall be the same as that for a straight take-off climb surface.

Note.— *See Figure 4-1. For guidance on construction of turns in approach or take-off climb surfaces see the Heliport Manual (Doc 9261).*

4.1.17 Where a curved portion of a take-off climb surface, that does not have its inner edge at the outer edge of a clearway, is provided, the sum of the radius of arc defining the centre line of the take-off climb surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

Note.— *Helicopter take-off performance is reduced in a turn and as such a straight portion along the take-off climb surface prior to the start of the curve allows for acceleration.*

4.1.18 Any variation in the direction of the centre line of a take-off climb surface shall be designed so as not to necessitate a turn of radius less than 270 m.

Note .— *For heliports intended to be used by helicopters operated in performance class 2 or 3, it is good practice for the departure paths to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimized. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.*

Obstacle-free sector/surface — helidecks

4.1.19 Description: A complex surface originating at and extending from, a reference point on the edge of the FATO of a helideck. In the case of a TLOF of less than 1 D, the reference point shall be located not less than 0.5 D from the centre of the TLOF.

4.1.20 Characteristics. An obstacle-free sector/surface shall subtend an arc of specified angle.

4.1.21 A helideck obstacle-free sector shall comprise of two components, one above and one below helideck level:

Note.— See Figure 4-2.

(a) Above helideck level: The surface shall be a horizontal plane level with the elevation of the helideck surface that subtends an arc of at least 210 degrees with the apex located on the periphery of the D circle extending outwards to a distance that will allow for an unobstructed departure path appropriate to the helicopter the helideck is intended to serve.

(b) Below helideck level: Within the (minimum) 210-degree arc, the surface shall additionally extend downward from the edge of the FATO below the elevation of the helideck to water level for an arc of not less than 180 degrees that passes through the centre of the FATO and outwards to a distance that will allow for safe clearance from the obstacles below the helideck in the event of an engine failure for the type of helicopter the helideck is intended to serve.

Note — *For both the above obstacle-free sectors for helicopters operated in performance class 1 or 2, the horizontal extent of these distances from the helideck will be compatible with the one-engine-inoperative capability of the helicopter type to be used.*

Limited obstacle sector/surface - helidecks

Note *— Where obstacles are necessarily located on the structure, a helideck may have a limited obstacle sector (LOS).*

4.1.22 Description. A complex surface originating at the reference point for the obstacle-free sector and extending over the arc not covered by the obstacle-free sector within which the height of obstacles above the level of the TLOF will be prescribed.

4.1.23 Characteristics. A limited obstacle sector shall not subtend an arc greater than 150 degrees. Its dimensions and location shall be as indicated in Figure 4-3 for a 1 D FATO with coincidental TLOF and Figure 4-4 for a 0.83 D TLOF.

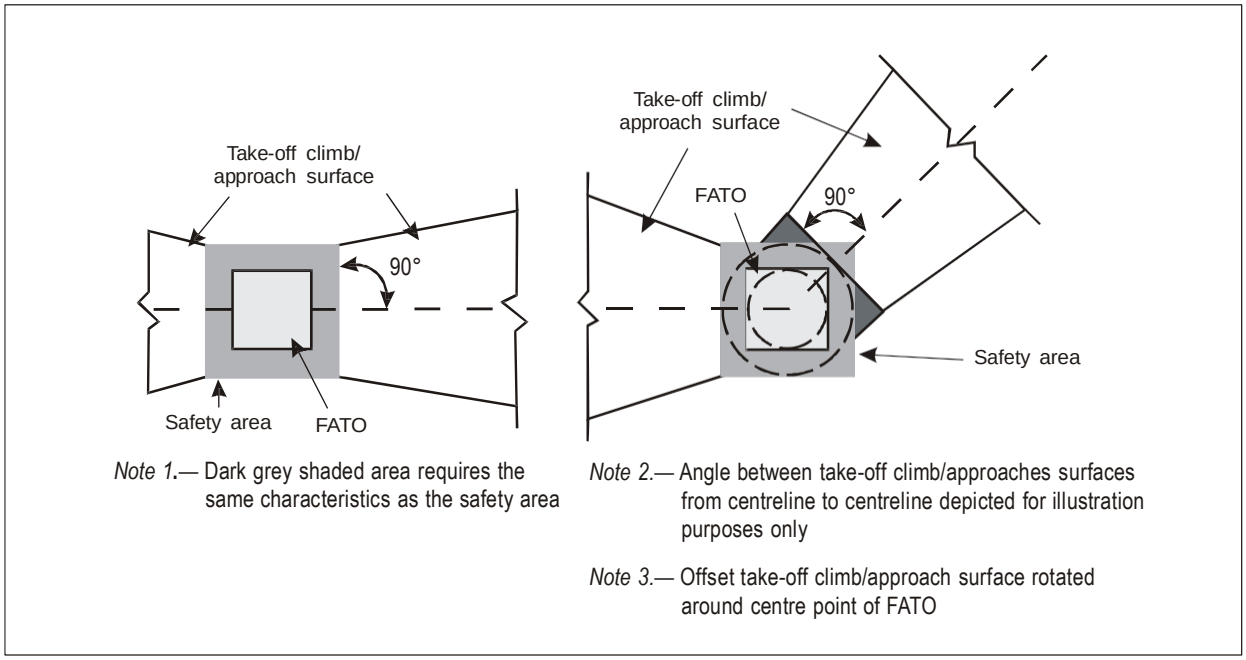


Figure 8. Obstacle limitation surfaces — Take-off climb and approach surface (icao Annex 14, Vol. II, Figure 4-1)

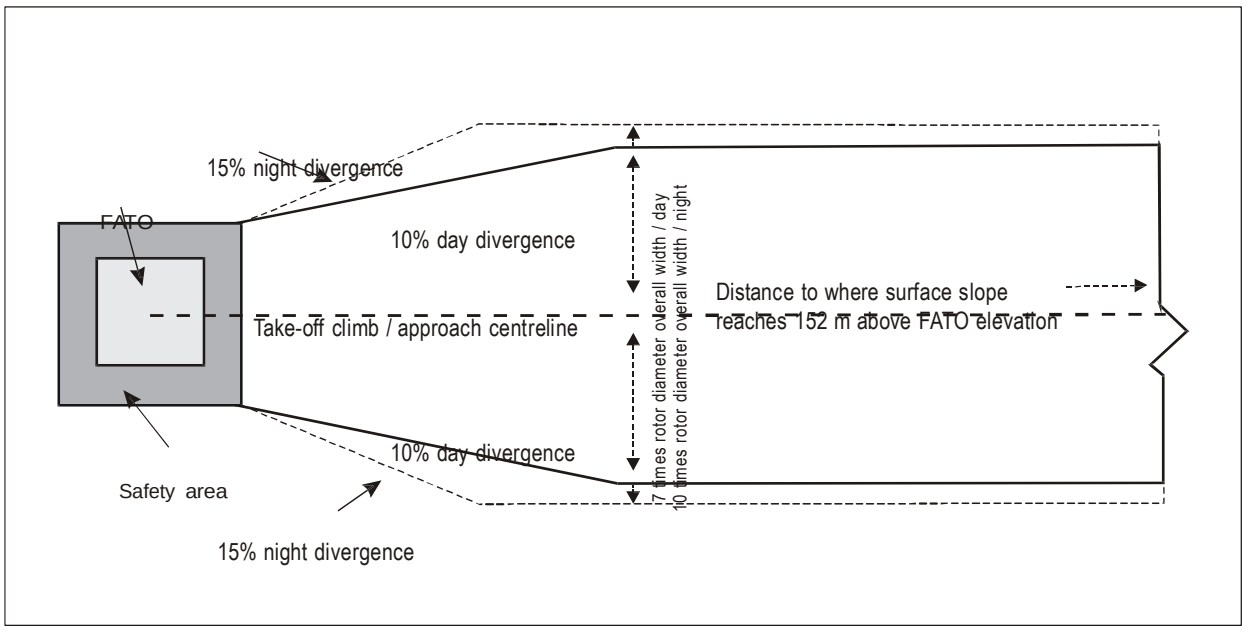
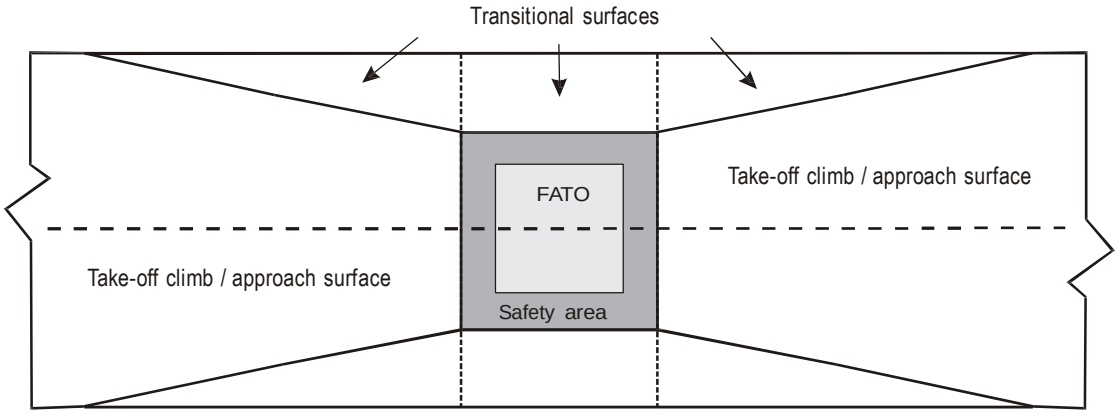


Figure 9. Take-off climb/Approach surface width (ICAO Annex 1q4 Vol. II, Fig. 4.2)



Note 1.— For single take-off climb / approach surface. Transition surface extends perpendicular to far side of Safety Area.
Note 2.— PANS-OPS, Doc 8168, Volume II, Part IV Helicopters, details procedure design criteria.
Note 3.— This figure shows a square FATO for illustration purposes only. For a circular FATO the transitional surface lower and upper edges would also be circular.

Figure 10. Transitional surface for a FATO with a PinS approach procedure with a VSS (ICAO Annex 14, Vol.II, Fig. 4-3)

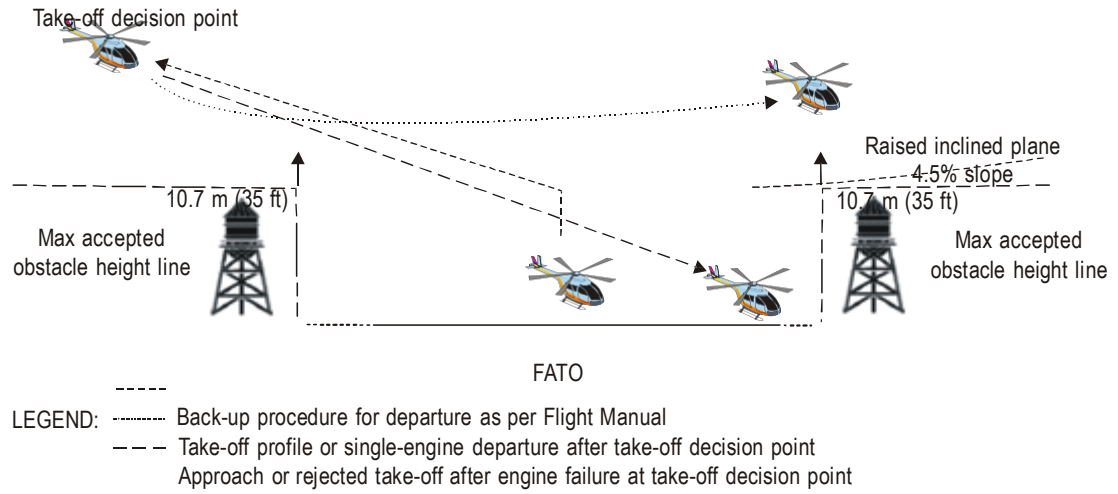


Figure 11. Example of raised inclined plane during operations in Performance Class 1 (ICAO Annex 14, Vol.II, Fig 4-4)

Note 1 *— This example diagram does not represent any specific profile, technique or helicopter type and is intended to show a generic example. An approach profile and a back-up procedure for departure profile are depicted. Specific manufacturers operations in performance class 1 may be represented differently in the specific Helicopter Flight Manual. ICAO Annex 6, Part 3, Attachment A provides back-up procedures that may be useful for operations in performance class 1.*

Note 2 *— The approach/landing profile may not be the reverse of the take-off profile.*

Note 3 *— Additional obstacle assessment might be required in the area that a back-up procedure is intended. Helicopter performance and the Helicopter Flight Manual limitations will determine the extent of the assessment required.*

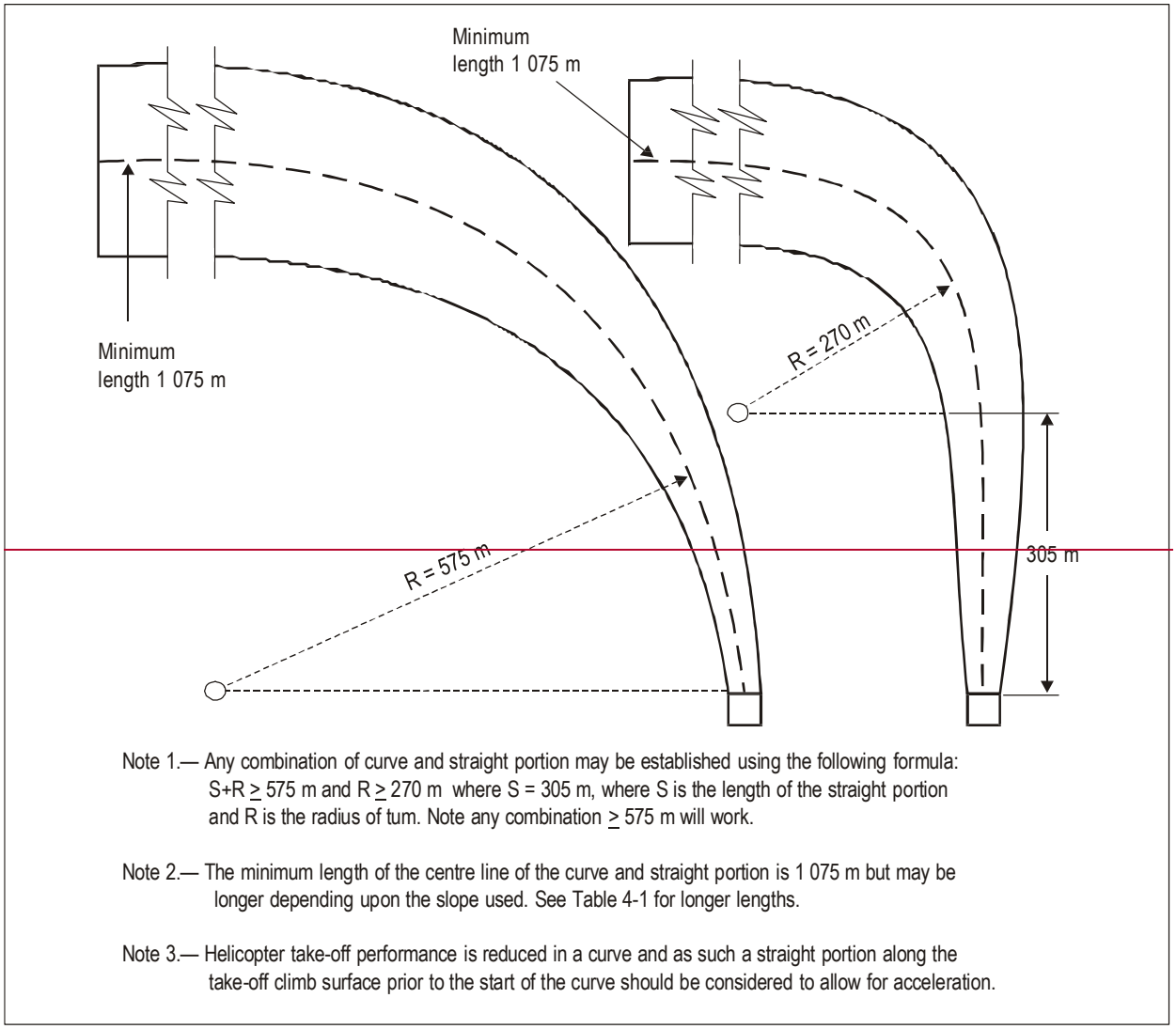


Figure 12. Curved approach and take-off climb surface for all FATOs (ICAO Annex 14 Vol.II, Fig. 4-5)

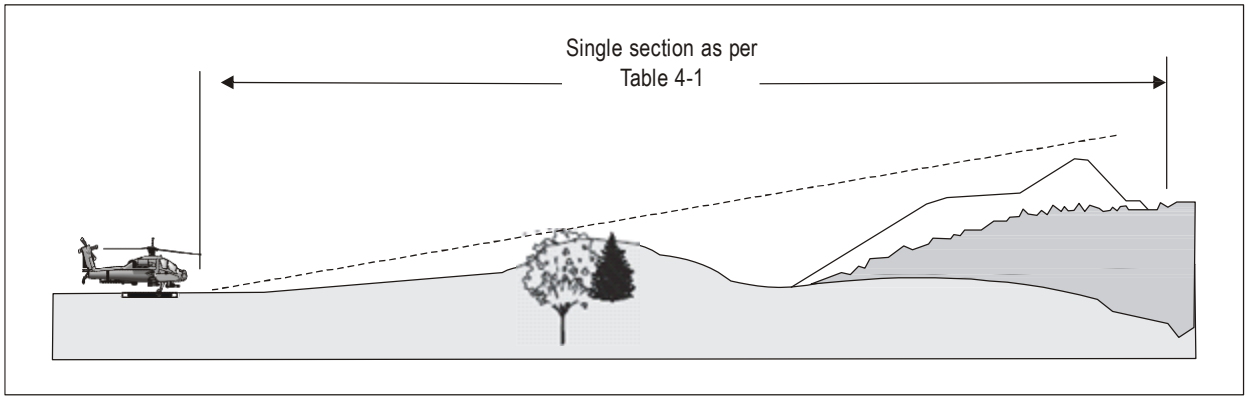
Table 2. Dimensions and slopes of obstacle limitation surfaces for all visual FATOs (icao Annex 14, Vol.II, Table 4-1)

SURFACE and DIMENSIONS	SLOPE DESIGN CATEGORIES		
	A	B	C
APPROACH and TAKE-OFF CLIMB SURFACE:			
Length of inner edge	Width of safety area	Width of safety area	Width of safety area
Location of inner edge	Safety area boundary (Clearway boundary if provided)	Safety area boundary	Safety area boundary
Divergence: (1st and 2nd section)			
Day use only	10%	10%	10%
Night use	15%	15%	15%
First Section:			
Length	3 386 m	245 m	1 220 m
Slope	4.5% (1:22.2)	8% (1:12.5)	12.5% (1:8)
Outer Width	(b)	N/A	(b)
Second Section:			
Length	N/A	830 m	N/A
Slope	N/A	16% (1:6.25)	N/A
Outer Width	N/A	(b)	N/A
Total Length from inner edge (a)	3 386 m	1 075 m	1 220 m
Transitional Surface: (FATOs with a PinS approach procedure with a VSS)			
Slope	50% (1:2)	50% (1:2)	50% (1:2)
Height	45 m	45 m	45 m

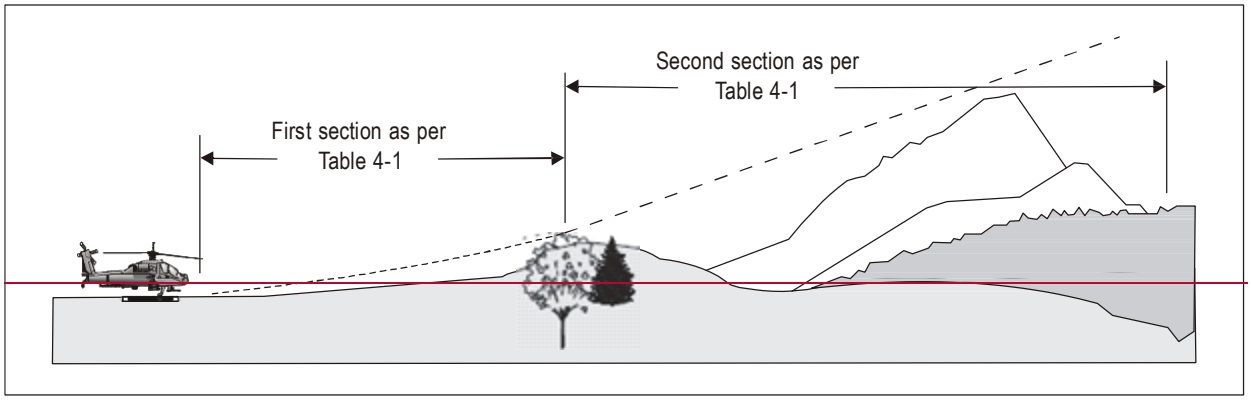
(a) The approach and take-off climb surface lengths of 3 386 m, 1 075 m and 1 220 m associated with the respective slopes, brings the helicopter to 152 m (500 ft) above FATO elevation.

(b) Seven rotor diameters overall width for day operations or 10 rotor diameters overall width for night operations.

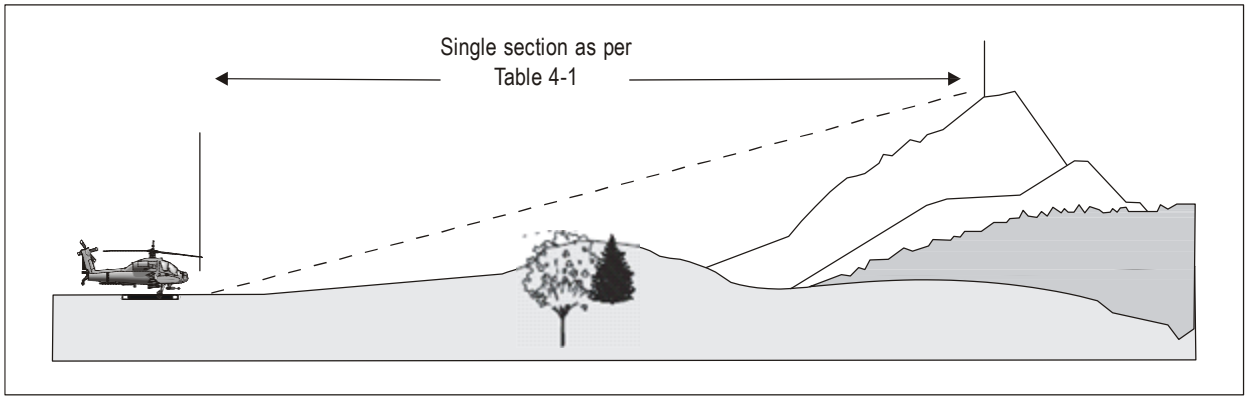
~~*Note — The slope design categories in Table 2 may not be restricted to a specific performance class of operation and may be applicable to more than one performance class of operation. The slope design categories depicted in Table 2 represent minimum design slope angles and not operational slopes. Slope category "A" generally corresponds with helicopters operated in performance class 1; slope category "B" generally corresponds with helicopters operated in performance class 3; and slope category "C" generally corresponds with helicopters operated in performance class 2. Consultation with helicopter operators will help to determine the appropriate slope category to apply according to the heliport environment and the most critical helicopter type for which the heliport is intended.*~~



a) Approach and take-off climb surfaces - "A" slope profile - 4.5% design



b) Approach and take-off climb surfaces - "B" slope profile - 8% and 16% design



c) Approach and take-off climb surfaces - "C" slope profile - 12.5% design

Figure 13. Approach and take-off climb surfaces with different slope design categories
(ICAO Appendix 14, Vol.II, Fig 4-6)

4.1.7. Any variation in the direction of the centre line of an approach surface shall be designed so as not to necessitate a turn radius less than 270 m.

Note *— For heliports intended to be used by helicopters operated in performance class 2 and 3, it is good practice for the approach paths to be selected so as to permit safe forced landing or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimised. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.*

Transitional surface

Note *— For a FATO at a heliport without a PinS approach incorporating a visual segment surface (VSS) there is no requirement to provide transitional surfaces.*

Description:

A complex surface along the side of the safety area and part of the side of the approach/take-off climb surface, that slopes upwards and outwards to a predetermined height of 45 m (150 ft).

Note *— See Figure 10. See Table 2 for dimensions and slopes of surfaces.*

4.1.8. Characteristics: The limits of a transitional surface shall comprise:

a lower edge beginning at a point on the side of the approach/take-off climb surface at a specified height above the lower edge extending down the side of the approach/take-off climb surface to the inner edge of the approach/take- off climb surface and from there along the length of the side of the safety area parallel to the centre line of the FATO; and

(a) an upper edge located at a specified height above the lower edge as set out in Table 2.

4.1.9. The elevation of a point on the lower edge shall be:

(a) along the side of the approach/take-off climb surface — equal to the elevation of the approach/take-off climb surface at that point; and

(a) along the safety area — equal to the elevation of the inner edge of the approach/take-off climb surface.

Note 1 *— If the origin of the inclined plane of the approach/take-off climb surface is raised as approved by an appropriate authority, the elevation of the origin of the transitional surface will be raised accordingly.*

Note 2 *— As a result of b) the transitional surface along the safety area will be curved if the profile of the FATO is curved, or a plane if the profile is a straight line.*

4.1.10. The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the FATO.

Take-off climb surface

4.1.10. Description:

An inclined plane, a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note *— See Figures 8, 9, 10 & 11 for depiction of surfaces. See Table 2 for dimensions and slopes of surfaces.*

~~4.1.11. Characteristics:~~

~~The limits of a take-off climb surface shall comprise:~~

~~(a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the take-off climb surface and located at the outer edge of the safety area;~~

~~(a) two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and~~

~~(a) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface and at a specified height of 152 m (500 ft) above the elevation of the FATO.~~

~~4.1.16. The elevation of the inner edge shall be the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the take-off climb surface. For heliports intended to be used by helicopters operated in performance class 1 and when approved by an appropriate authority, the origin of the inclined plane may be raised directly above the FATO.~~

~~4.1.17. Where a clearway is provided the elevation of the inner edge of the take-off climb surface shall be located at the outer edge of the clearway at the highest point on the ground based on the centre line of the clearway.~~

~~4.1.18.~~4.1.7. ~~In the case of a straight take-off climb surface, the slope shall be measured in the vertical plane containing the centre line of the surface~~.

~~4.1.18. In the case of a take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope of the centre line shall be the same as that for a straight take-off climb surface.~~

~~***Note** — See Figure 12.*~~

~~4.1.18. In the case of a take-off climb surface involving a turn, the surface shall not contain more than one curved portion.~~

~~4.1.18. Where a curved portion of a take-off climb surface is provided the sum of the radius of arc defining the centre line of the take-off climb surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.~~

~~4.1.18. Any variation in the direction of the centre line of a take-off climb surface shall be designed so as not to necessitate a turn of radius less than 270 m.~~

~~***Note 1** — Helicopter take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve allows for acceleration.~~

~~***Note 2** — For heliports intended to be used by helicopters operated in performance class 2 and 3 it is good practice for the departure paths to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimised. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.~~

Obstacle-free sector/surface - helidecks

4.1.19. Description:

A complex surface originating at and extending from, a reference point on the edge of the FATO of a helideck. In the case of a TLOF of less than 1 D, the reference point shall be located not less than 0.5 D from the centre of the TLOF.

Characteristics:

An obstacle-free sector/surface shall subtend an arc of specified angle.

4.1.20. A helideck obstacle-free sector shall comprise of two components, one above and one below helideck level:

Note *— See Figure 14.*

(a) *Above helideck level:* The surface shall be a horizontal plane level with the elevation of the helideck surface that subtends an arc of at least 210 degrees with the apex located on the periphery of the D circle extending outwards to a distance that will allow for an unobstructed departure path appropriate to the helicopter the helideck is intended to serve.

(a) *Below helideck level*: Within the (minimum) 210-degree arc, the surface shall additionally extend downward from the edge of the FATO below the elevation of the helideck to water level for an arc of not less than 180 degrees that passes through the centre of the FATO and outwards to a distance that will allow for safe clearance from the obstacles below the helideck in the event of an engine failure for the type of helicopter the helideck is intended to serve.

Note *— For both the above obstacle-free sectors for helicopters operated in performance class 1 or 2, the horizontal extent of these distances from the helideck will be compatible with the one engine inoperative capability of the helicopter type to be used.*

Limited obstacle sector/surface - helidecks

Note *— Where obstacles are necessarily located on the structure, a helideck may have a limited obstacle sector (LOS).*

4.1.20. Description:

A complex surface originating at the reference point for the obstacle-free sector and extending over the arc not covered by the obstacle-free sector within which the height of obstacles above the level of the TLOF will be prescribed.

4.1.20. Characteristics:

A limited obstacle sector shall not subtend an arc greater than 150 degrees. Its dimensions and location shall be as indicated in Figure 14 for a 1 D FATO with coincidental TLOF and Figure 15 for a 0.83 D TLOF.

4.2. Obstacle Limitation Requirements

Note 1 *— The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a FATO, i.e. approach manoeuvre to hover or landing, or take-off manoeuvre and type of approach, and are intended to be applied when such use is made of the FATO. In cases where operations are conducted to or from both directions of a FATO, then the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.*

Note 2 *— Guidance on obstacle protection surfaces, for when a visual approach slope indicator (VASI) is installed, is given in the onshore section of ICAO Heliport Manual (Doc 9261).*

Note 3.— *Guidance on obstacle protection surfaces, or operational limitations, when temporary obstacles are present, is given in the Heliport Manual (Doc 9261).*

Onshore heliports~~Surface-level heliports~~

4.2.1. The following obstacle limitation surfaces shall be established for a FATO at heliports with a PinS approach or departure procedure with a proceed visually instruction:~~utilizing a visual segment surface:~~

(a) take-off climb surface;

(b) approach surface; and

(c) transitional surfaces.

~~***Note 1 — See Figure 10.***~~

Note ~~***2***~~ *— ICAO Procedures for Air Navigation Services — Aircraft Operations, (PANS-OPS, Doc 8168), Volume II, Part IV — Helicopters, details procedure design criteria.*

4.2.2. The following obstacle limitation surfaces shall be established for a FATO at heliports, other than specified in 4.2.1, including heliports with a PinS approach or departure procedure without a proceed visually instruction:~~where a visual segment surface is not provided:~~

(a) take-off climb surface; and

(b) approach surface.

4.2.3. The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than, those specified in Table ~~2~~ 4-1. ~~and shall be located as shown in Figures 8, 9 and 13.~~

4.2.4. Except ~~For~~ for heliports facilitating performance class 1 operations, that have an approach/take-off climb surface with a 4.5 per cent slope design, objects shall be permitted to penetrate the obstacle limitation surface, if the results of an aeronautical study approved by an appropriate authority have reviewed the associated risks and mitigation measures.

Note 1 *— The identified objects may limit the heliport operation.*

Note 2 *— ICAO Annex 6, Part 3, provides procedures that may be useful in determining the extent of obstacle penetration.*

4.2.5. New objects or extensions of existing objects shall not be permitted above any of the surfaces in 4.2.1 and 4.2.2 except when shielded by an existing immovable object. ~~or after an aeronautical study approved by an appropriate authority determines that the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.~~

Note *— Circumstances in which the shielding principle may reasonably be applied are described in ICAO Airport Services Manual (Doc 9137), Part 6.*

4.2.6. Existing objects above any of the surfaces in 4.2.1 and 4.2.2 should, as far as practicable, be removed except when the object is shielded by an existing immovable object. ~~or after an aeronautical study approved by an appropriate authority determines that the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.~~

Note *— The application of curved approach or take-off climb surfaces and/or the utilization of vertical procedures~~as specified in 4.1.5 or 4.1.18~~ may alleviate the problems created by objects infringing these surfaces.*

4.2.7. A ~~surface-level~~ heliport should~~shall~~ have at least two~~one~~ approach and take-off climb surface surfaces, separated by not less than 135°. ~~. An aeronautical study shall be undertaken by an appropriate authority when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:~~

~~the area/terrain over which the flight is being conducted;~~

~~the obstacle environment surrounding the heliport and the availability of at least one protected side slope ;~~

~~(b) the performance and operating limitations of helicopters intending to use the heliport; and~~

~~(b) the local meteorological conditions including the prevailing winds.~~

Note.— See the Heliport Manual (Doc 9261) for guidance.

Table 4-1. Approach and take-off climb slope design categories

Surface and dimensions	Slope design categories		
	A	B	C
Approach and take-off climb surface:			
Length of inner edge	Width of safety area	Width of safety area	Width of safety area
Location of inner edge	Safety area boundary (Helicopter clearway boundary if provided)	Safety area boundary	Safety area boundary
Divergence: (1st and 2nd section)			
Day use only	10%	10%	10%
Night use	15%	15%	15%
First section:			
Length	3386 m	245 m	1220 m

Slope	4.5% (1:22.2)	8% (1:12.5)	12.5% (1:8)
Outer width	(b)	N/A	(b)
Second section:			
Length	N/A	830 m	N/A
Slope	N/A	16% (1:6.25)	N/A
Outer width	(b)	N/A	(b)
Total length from inner edge (a)	3386 m_c	1075 m_c	1220 m_c
Transitional surface:			
Slope	50% (1:2)	50% (1:2)	50% (1:2)
Height	45 m_d	45 m_d	45 m_d

a. The approach and take-off climb surface lengths of 3 386 m, 1 075 m and 1 220 m associated with the respective slopes brings the helicopter to 152 m (500 ft) above FATO elevation.

b. Seven rotor diameters overall width for day operations or 10 rotor diameters overall width for night operations.

c. This length may be reduced if vertical procedures are in place or extended/reduced if the approach or take-off climb surface is extended/reduced to meet the OCS of the PinS approach or departure procedure.

d. See 4.1.9 b).

Note.— *Guidance on the application of slope categories is provided in the Heliport Manual (Doc 9261).*

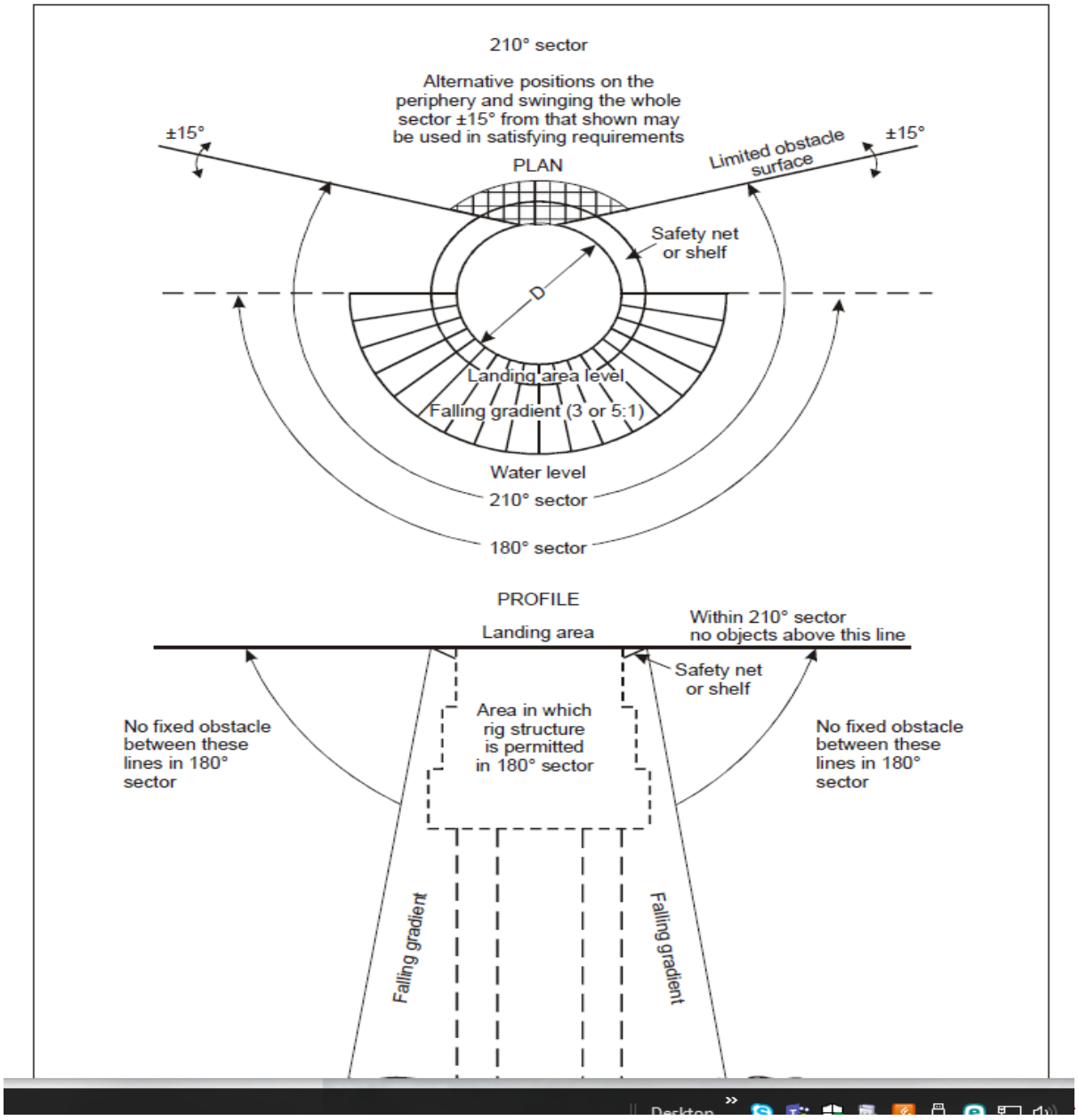


FIGURE 13. HELIDECK OBSTACLE-FREE SECTOR(ICAO ANNEX14,VOL ||,FIG 4.7)

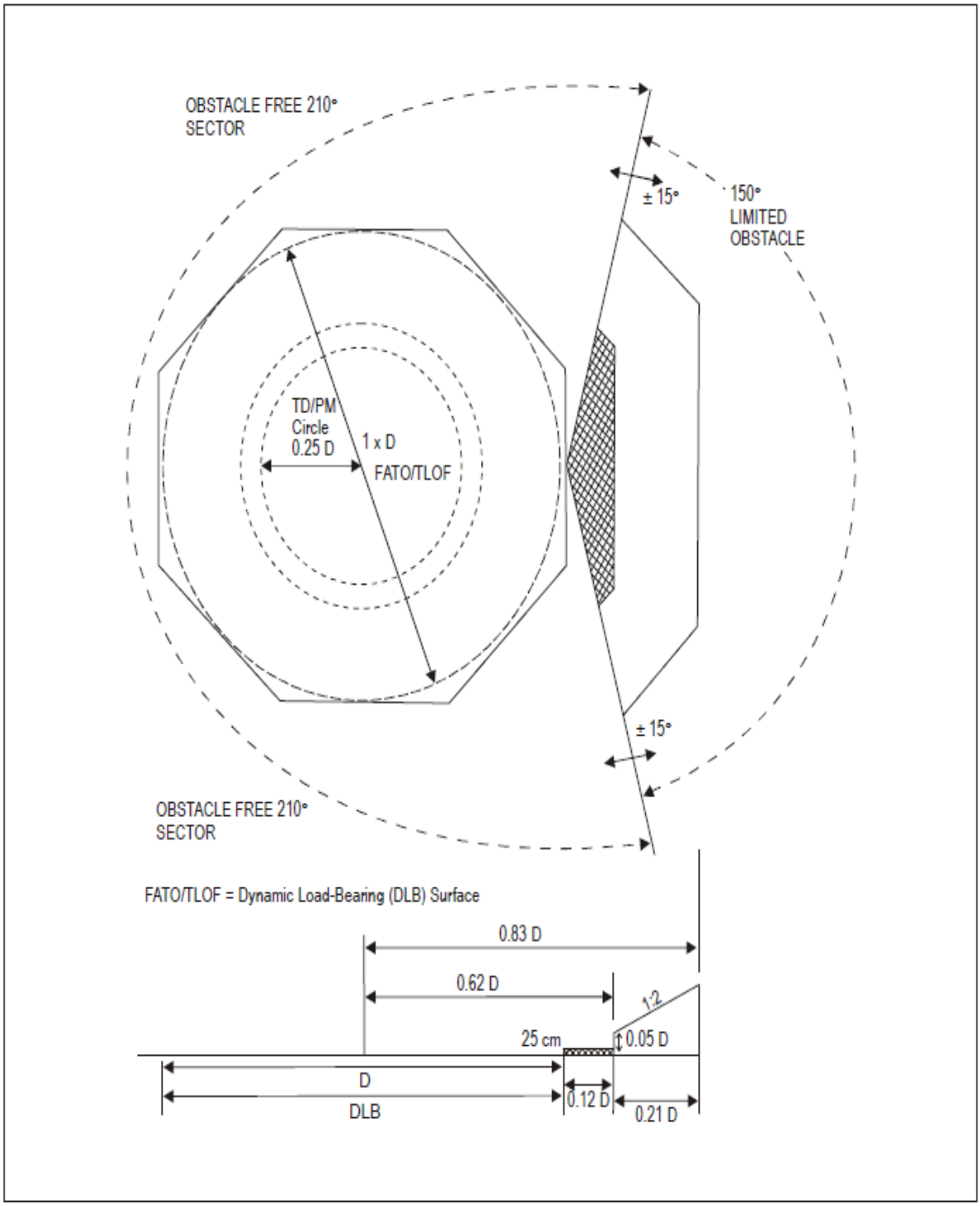


Figure 4-8. Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1 D and larger

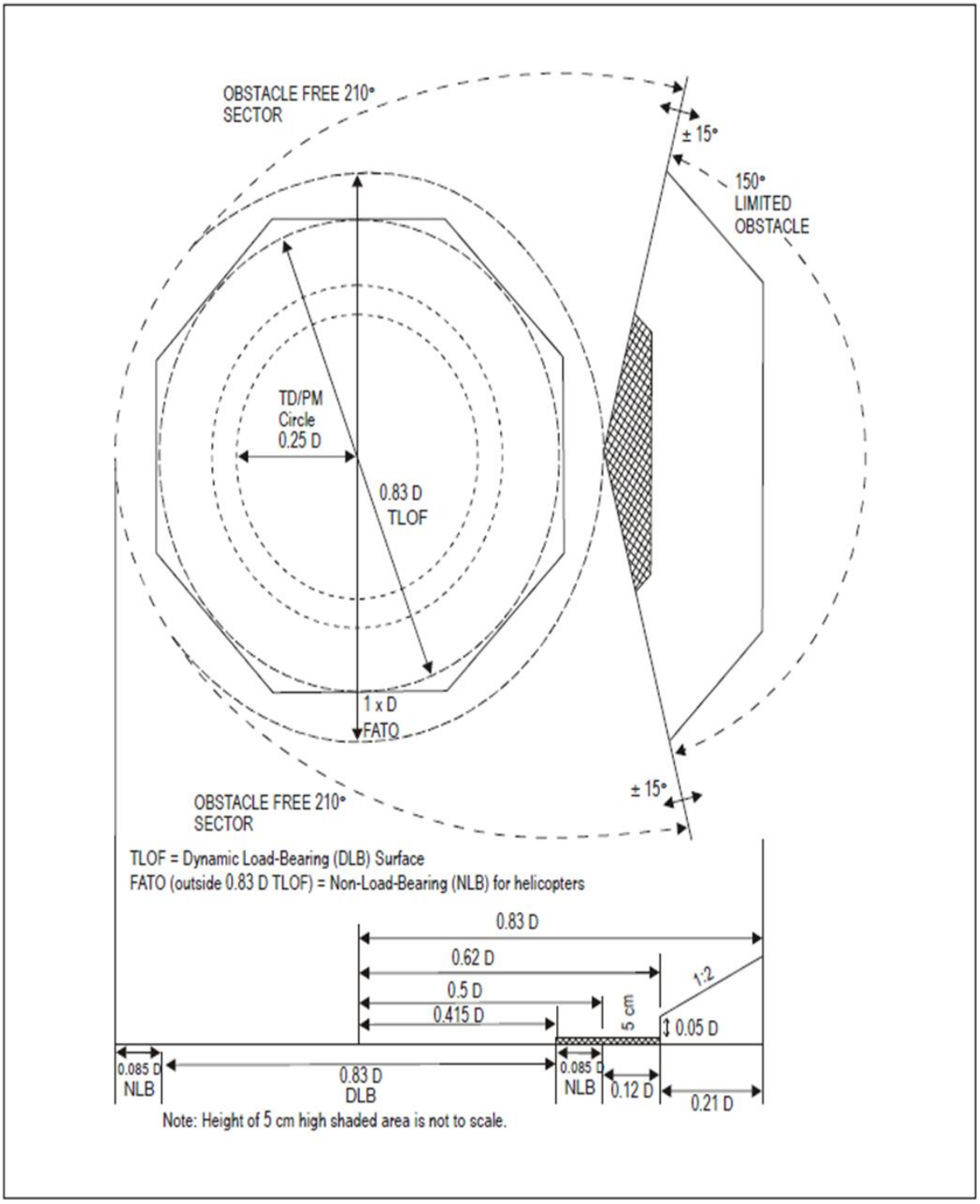


Figure 4-9. Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger

4.2.8. *A surface-level heliport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimise crosswind conditions and permit for a balked landing.*

***Note** — See ICAO Heliport Manual (Doc 9261) for guidance.*

~~**Elevated heliports**~~

~~4.2.9. The obstacle limitation surfaces for elevated heliports shall conform to the requirements for surface level heliports specified in 4.2.1 to 4.2.6.~~

~~4.2.10. An elevated heliport shall have at least one approach and take-off climb surface. An aeronautical study shall be undertaken by an appropriate authority when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:~~

~~(b) the area/terrain over which the flight is being conducted;~~

~~(b) the obstacle environment surrounding the heliport and the availability of at least one protected side slope;~~

~~(b) the performance and operating limitations of helicopters intending to use the heliport; and~~

~~(b) the local meteorological conditions including the prevailing winds.~~

~~4.2.11. *An elevated heliport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimise crosswind conditions and permit for a balked landing.*~~

~~***Note** — See ICAO Heliport Manual (Doc 9261) for guidance.*~~

Helidecks

4.2.8~~12~~. A helideck shall have an obstacle-free sector.

***Note** — A helideck may have a LOS (see 4.1.23~~6~~).*

4.2.9~~13~~. There shall be no fixed obstacles within the obstacle-free sector above the obstacle-free surface.

4.2.10~~4~~. In the immediate vicinity of the helideck, obstacle protection for helicopters shall be provided below the helideck level. This protection shall extend over an arc of at least 180 degrees with the origin at the centre of the FATO, with a descending gradient having a ratio of one unit horizontally to five units vertically from the edges of the FATO within the 180-degree sector. This descending gradient may be reduced to a ratio of one unit horizontally to three units vertically within the 180-degree sector for multi-engine helicopters operated in performance class 1 or 2. (See Figure 4-2~~13~~.)

***Note** — Where there is a requirement to position, at sea surface level, one or more offshore support vessel(s) (e.g. a Standby Vessel) essential to the operation of a fixed or floating offshore facility, but located within the proximity of the fixed or floating offshore facility, any offshore support vessel(s) would need to be positioned so as not to compromise the safety of helicopter operations during take-off departure and/or approach to landing.*

4.2.11~~5~~. For a TLOF of 1 D and larger, within the 150-degree limited obstacle surface/sector out to a distance of 0.12 D measured from the point of origin of the limited obstacle sector, objects shall not exceed a height of 25 cm above the TLOF. Beyond that arc, out to an overall distance of a further 0.21 D measured from the end of the first sector, the limited obstacle surface rises at a rate of one unit vertically for each two

units horizontally originating at a height 0.05 D above the level of the TLOF. (See Figure 4-3~~14~~.)

Note — *Where the area enclosed by the TLOF perimeter marking is a shape other than circular, the extent of the LOS segments are represented as lines parallel to the perimeter of the TLOF rather than arcs. Figure 4-3~~14~~ has been constructed on the assumption that an octagonal helideck arrangement is provided. Further guidance for square (quadrilateral) and circular FATO and TLOF arrangements is given in ICAO Heliport Manual (Doc 9261).*

4.2.12~~6~~. For a TLOF less than 1 D within the 150-degree limited obstacle surface/sector out to a distance of 0.62 D and commencing from a distance 0.5 D, both measured from the centre of the TLOF, objects shall not exceed a height of 5 cm above the TLOF. Beyond that arc, out to an overall distance of 0.83 D from the centre of the TLOF, the limited obstacle surface rises at a rate of one unit vertically for each two units horizontally originating at a height 0.05 D above the level of the TLOF. (See Figure 4-4~~15~~.)

Note — *Where the area enclosed by the TLOF perimeter marking is a shape other than circular, the extent of the LOS segments are represented as lines parallel to the perimeter of the TLOF rather than arcs. Figure 4-~~9~~ has been constructed on the assumption that an octagonal helideck arrangement is provided. Further guidance for square (quadrilateral) and circular FATO and TLOF arrangements is given in the ICAO Heliport Manual (Doc 9261).*

Shipboard heliports

4.2.13~~7~~. The specifications in 4.2.16~~20~~ and 4.2.18~~22~~ shall be applicable for shipboard heliports completed on or after 1 January 2012.

Purpose-built heliports located forward or aft

4.2.14~~8~~. When helicopter operating areas are provided in the bow or stern of a ship they shall apply the obstacle criteria for helidecks.

Amidships location — purpose-built and non-purpose-built

4.2.15~~9~~. Forward and aft of a TLOF of 1 D and larger shall be two symmetrically located sectors, each covering an arc of 150 degrees, with their apexes on the periphery of the TLOF. Within the area enclosed by these two sectors, there shall be no objects rising above the level of the TLOF, except those aids essential for the safe operation of a helicopter and then only up to a maximum height of 25 cm.

4.2.16~~20~~. Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

Note — *Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.*

4.2.17~~21~~. To provide further protection from obstacles fore and aft of the TLOF, rising surfaces with gradients of one unit vertically to five units horizontally shall extend from the entire length of the edges of the two 150-degree sectors. These surfaces shall extend for a horizontal distance equal to at least 1 D of the largest helicopter the TLOF is intended to serve and shall not be penetrated by any obstacle. (See Figure 4-5~~16~~.)

Non-purpose-built heliports

Ship's side location

4.2.1822. No objects shall be located within the TLOF except those aids essential for the safe operation of a helicopter (such as nets or lighting) and then only up to a maximum height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

4.2.19 From the fore and aft mid-points of the D circle in two segments outside the circle, limited obstacle areas shall extend to the ship's rail to a fore and aft distance of

1.5 times the fore-to-aft-dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle. Within these areas there shall be no objects rising above a maximum height of 25 cm above the level of the TLOF. (See Figure 17.) Such objects shall only be present if they do not represent a hazard to helicopters.

4.2.20 A limited obstacle sector horizontal surface shall be provided, at least 0.25 D beyond the diameter of the D circle, which shall surround the inboard sides of the TLOF to the fore and aft mid-points of the D circle The limited obstacle sector shall continue to the ship's rail to a fore and aft distance of 2.0 times the fore-to-aft dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle. Within this sector there shall be no objects rising above a maximum height of 25 cm above the level of the TLOF.

***Note** — Any objects located within the areas described in 4.2.19 and 4.2.20 that exceed the height of the TLOF are notified to the helicopter operator using a ship's helicopter landing area plan. For notification purposes it may be necessary to consider immoveable objects beyond the limit of the surface prescribed in 4.2.19 particularly if objects are significantly higher than 25 cm and in close proximity to the boundary of the LOS. See ICAO Heliport Manual (Doc 9261) for guidance.*

Winching areas

4.2.21 An area designated for winching on-board ships shall be comprised of a circular clear zone of diameter 5 m and extending from the perimeter of the clear zone, a concentric manoeuvring zone of diameter 2 D. (See Figure 4-7.)

4.2.22 The manoeuvring zone shall be comprised of two areas:

a) the inner manoeuvring zone extending from the perimeter of the clear zone and of a circle of diameter not less than 1.5 D; and

b) the outer manoeuvring zone extending from the perimeter of the inner manoeuvring zone and of a circle of diameter not less than 2 D.

~~not less than 2 D.~~

4.2.23 Within the clear zone of a designated winching area, no objects shall be located above the level of its surface.

4.2.24 Objects located within the inner manoeuvring zone of a designated winching area shall not exceed a height of 3 m.

4.2.25 Objects located within the outer manoeuvring zone of a designated winching area shall not exceed a height of 6 m.

Note.— *See the Heliport Manual (Doc 9261) for guidance.*

~~6 m.~~

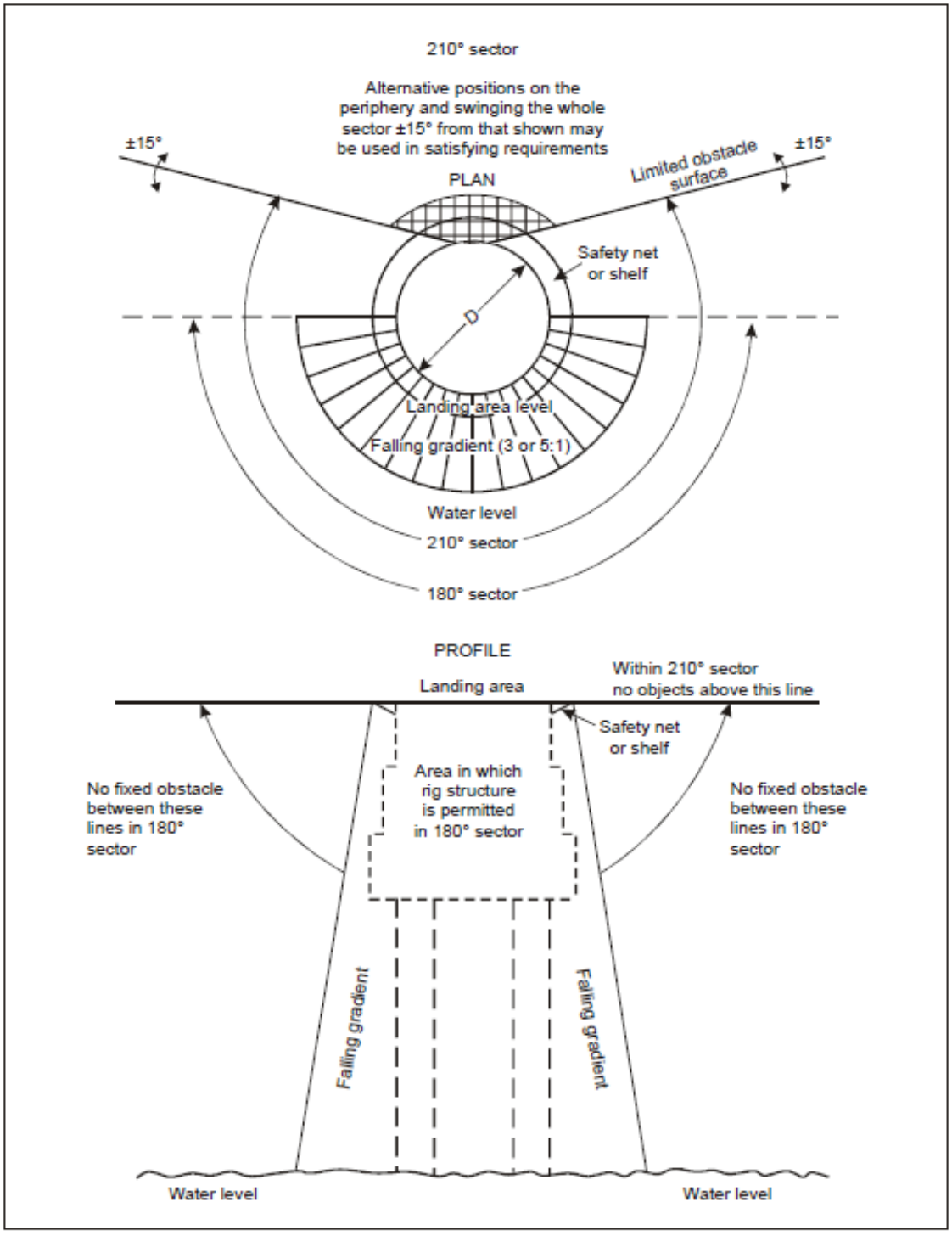


Figure 4-2. Helideck obstacle-free sector

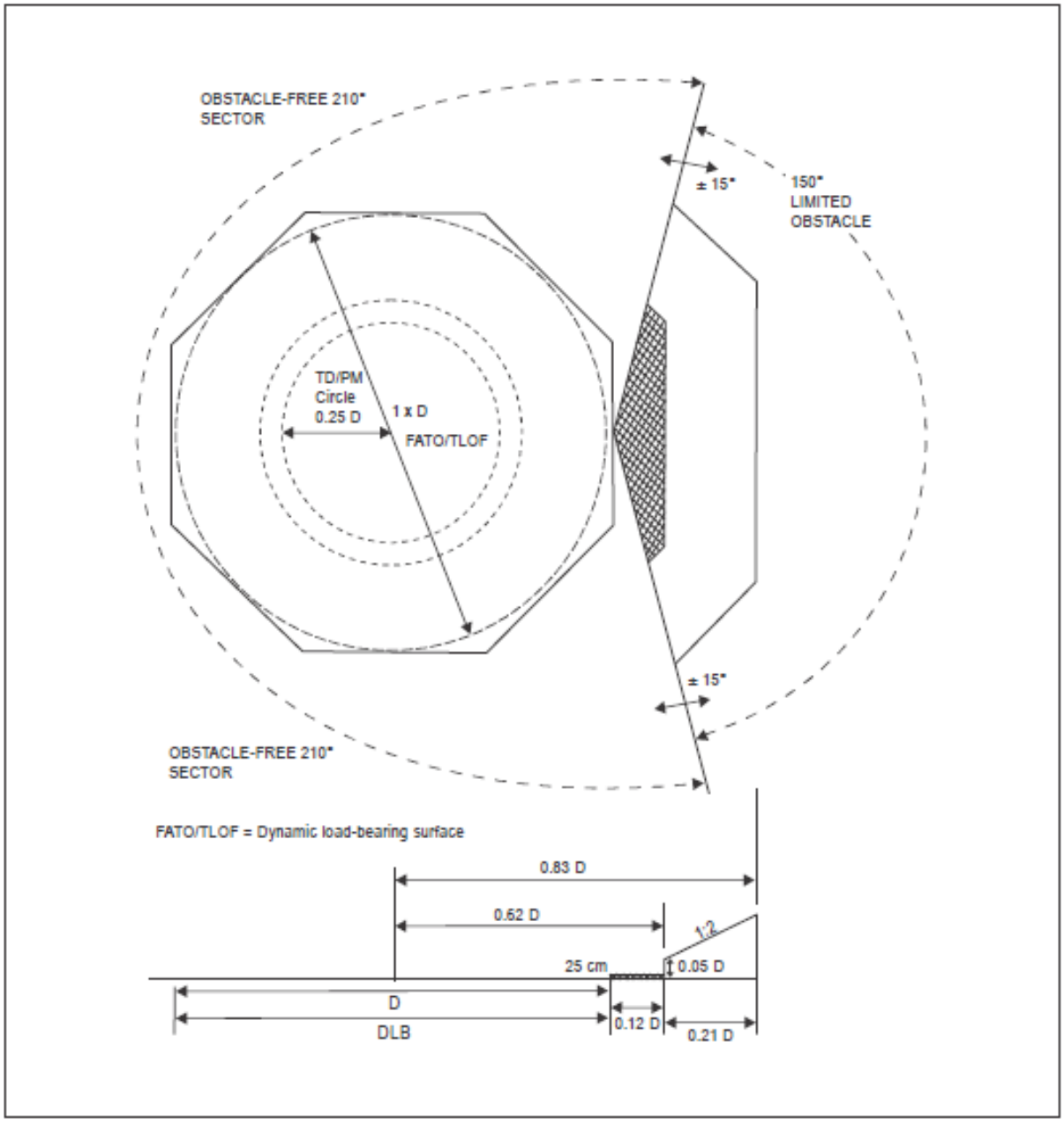


Figure 4-3. Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1 D and larger

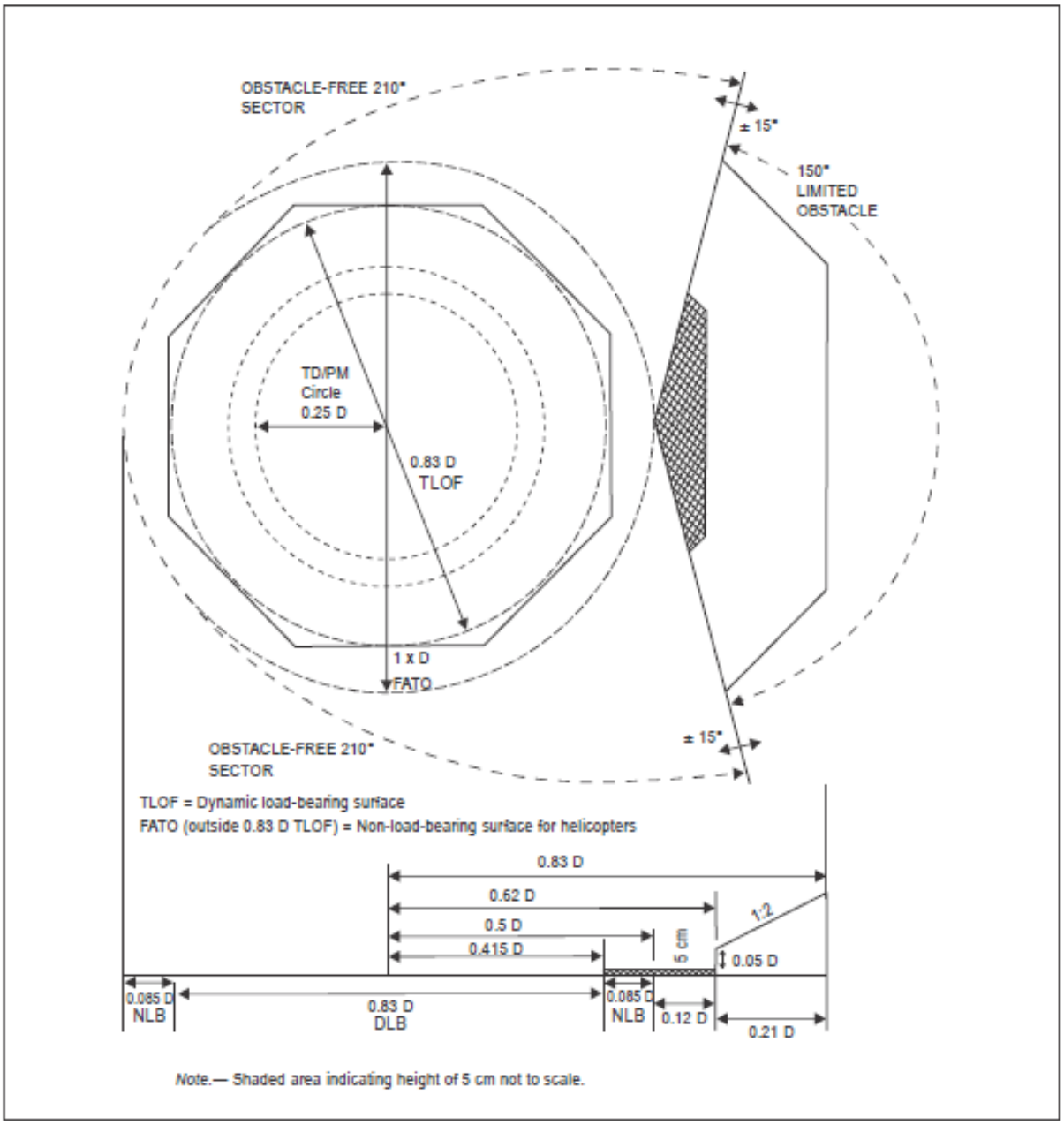


Figure 4-4. Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger

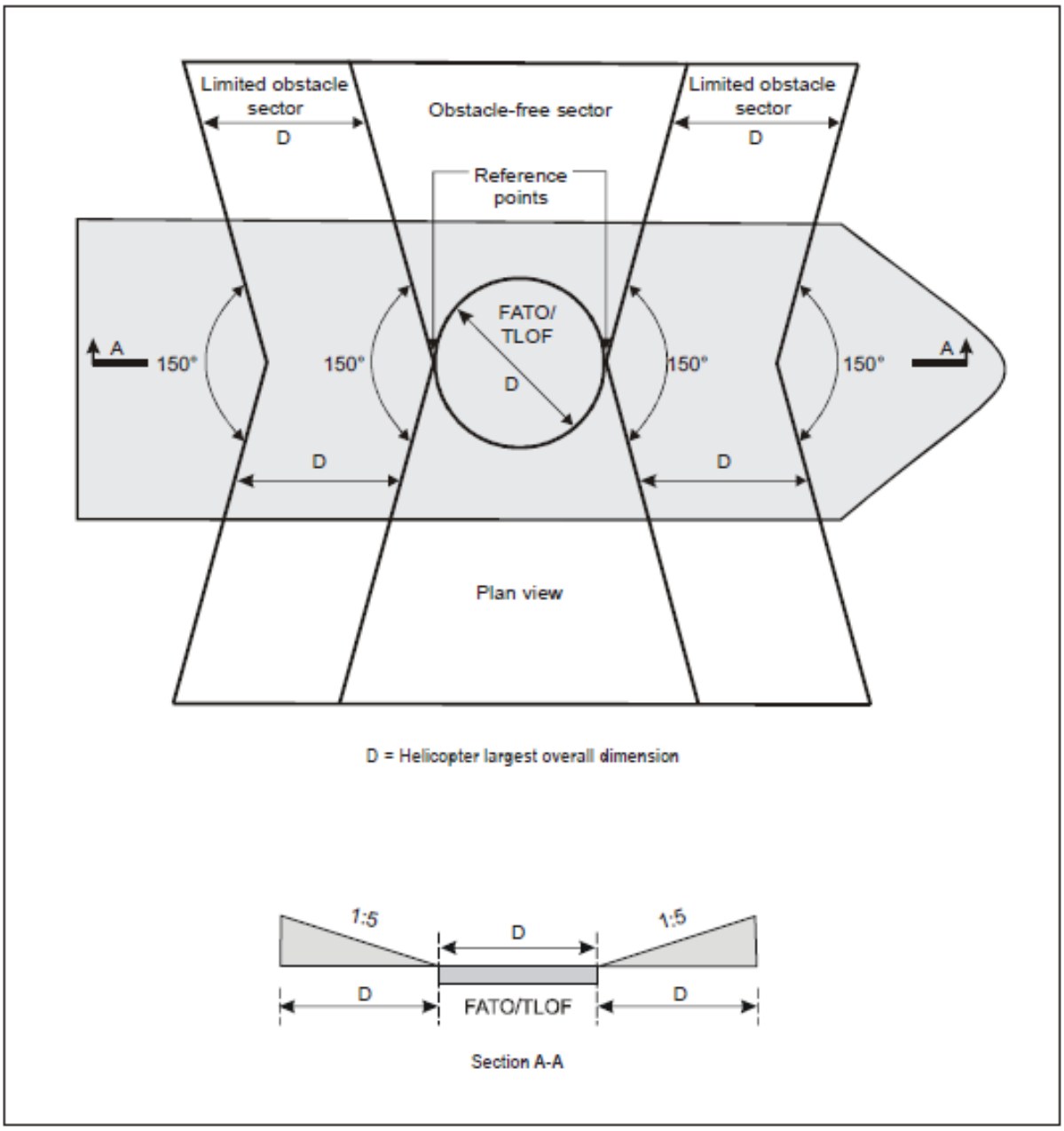


Figure 4-5. Amidship's location — shipboard heliport obstacle limitation surfaces

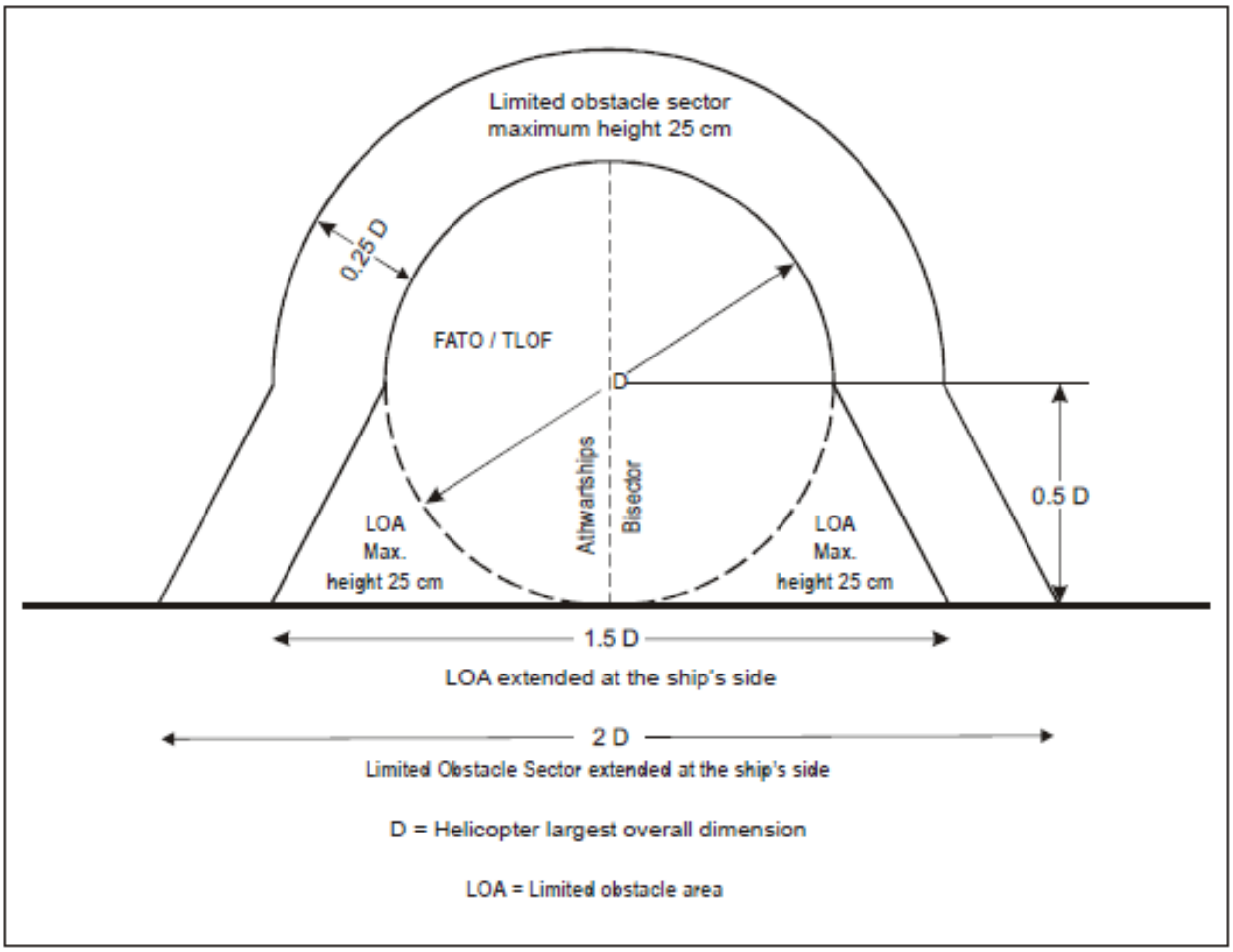


Figure 4-6. Ships-side non-purpose-built heliport obstacle limitation sectors and surfaces

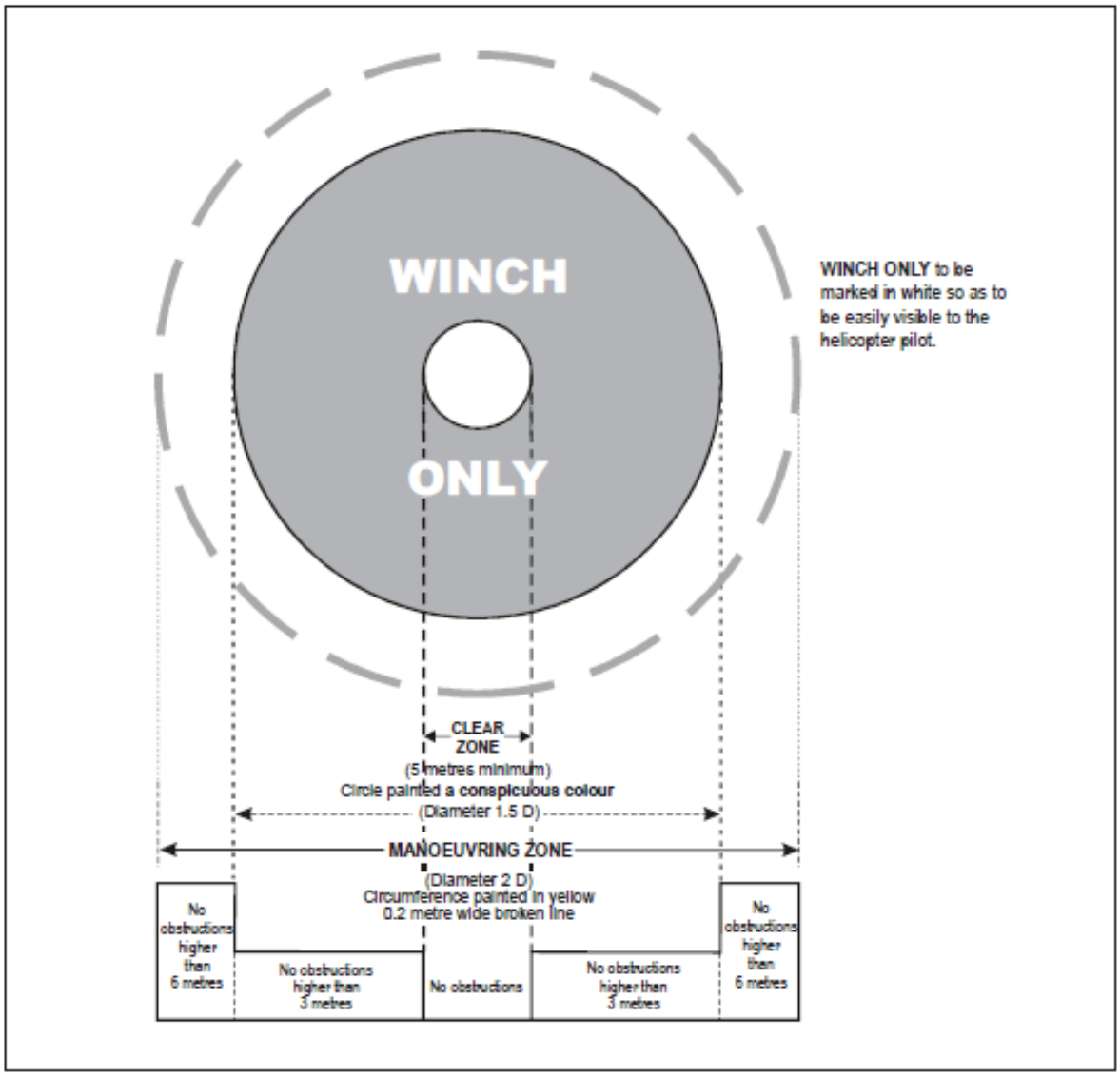


Figure 4-7. Winching area of a ship

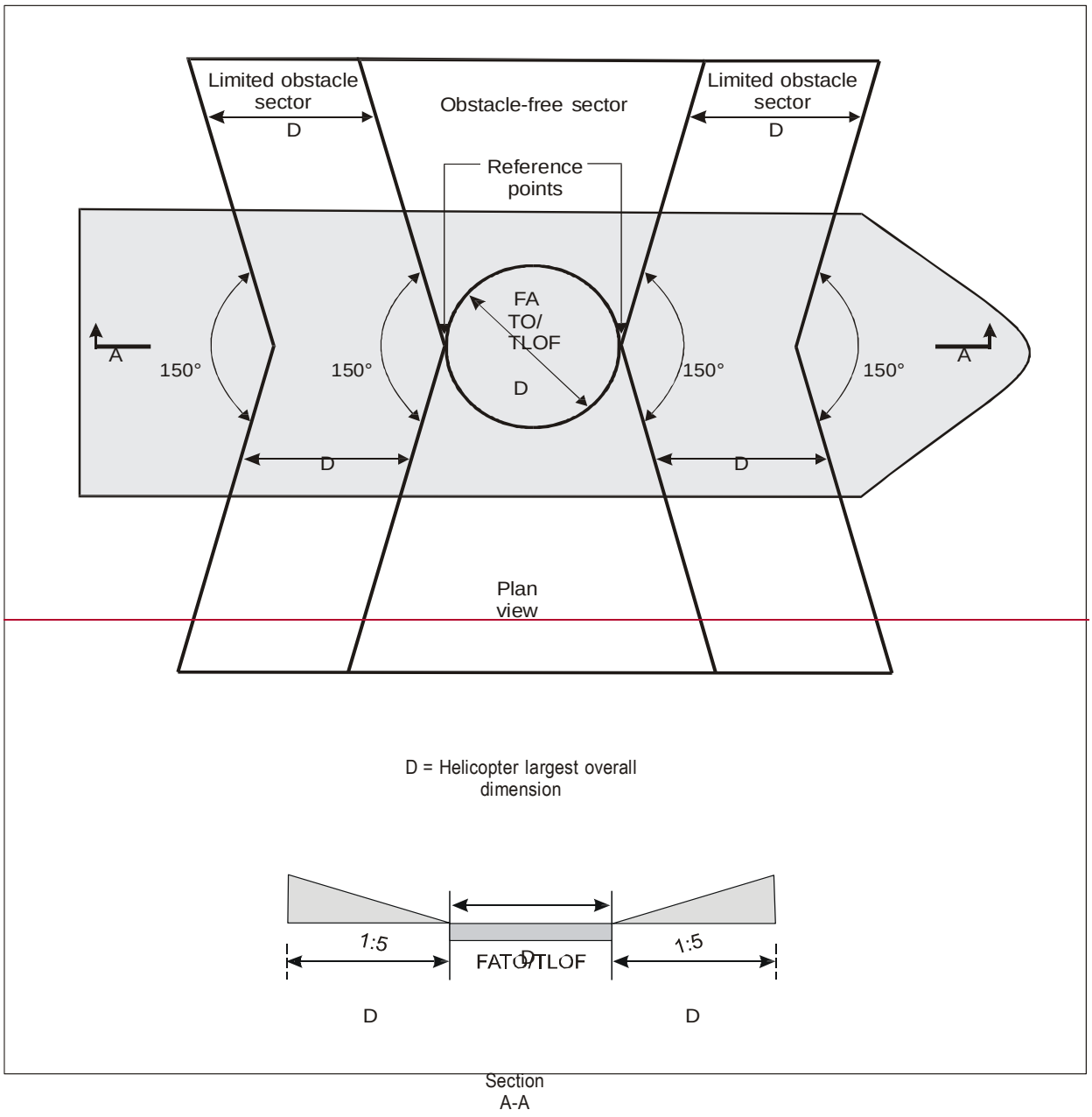
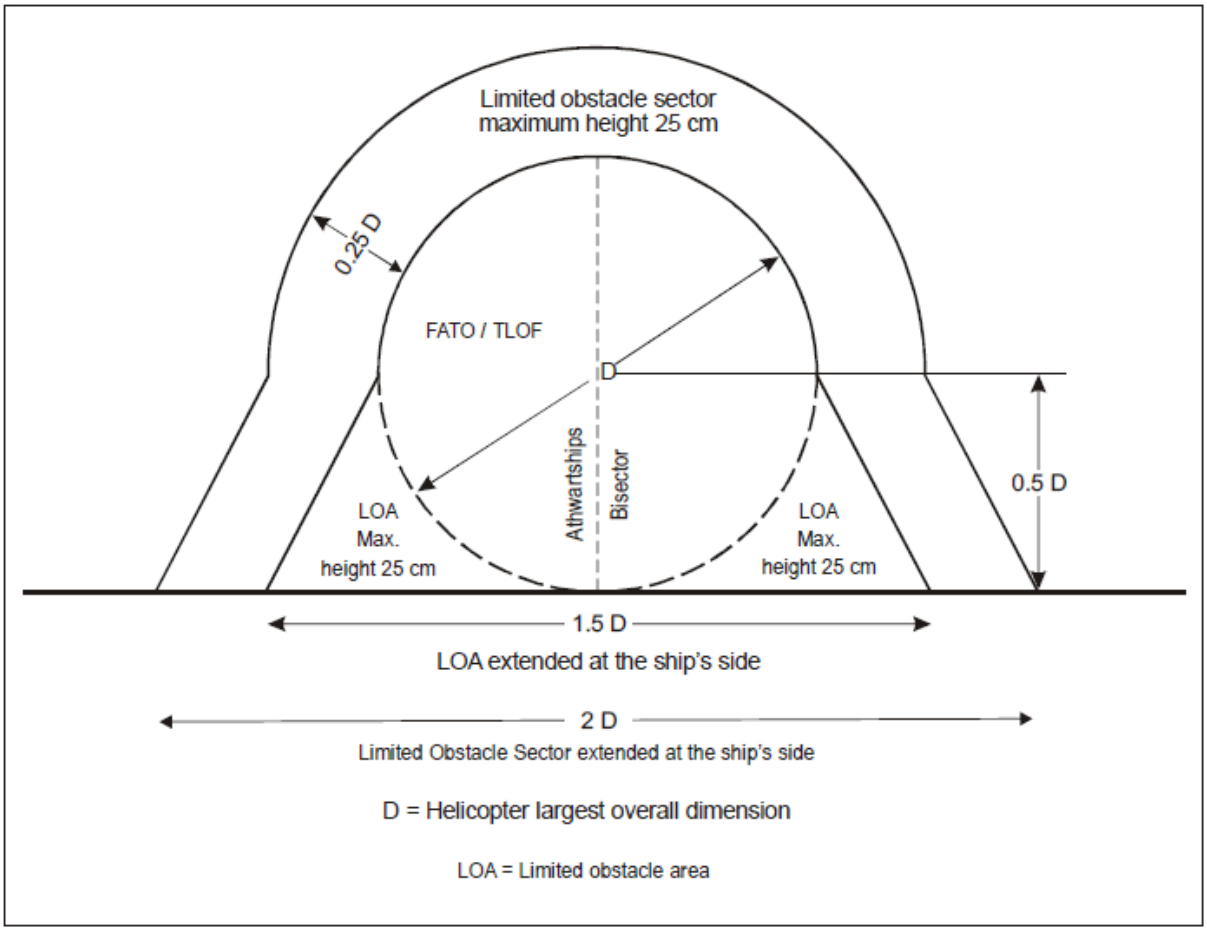


Figure 16. Amidship's location — Shipboard heliport obstacle limitation surfaces
(ICAO Annex14, Vol. II, Fig. 4-10)

4.2.23. ~~From the fore and aft mid-points of the D circle in two segments outside the circle, limited obstacle areas shall extend to the ship's rail to a fore and aft distance of 1.5 times the fore-to-aft-dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle. Within these areas there shall be no objects rising above a maximum height of 25 cm above the level of the TLOF. (See Figure 17.) Such objects shall only be present if they do not represent a hazard to helicopters.~~

4.2.24. ~~A limited obstacle sector horizontal surface shall be provided, at least 0.25 D beyond the diameter of the D circle, which shall surround the inboard sides of the TLOF to the fore and aft mid-points of the D circle The limited obstacle sector shall continue to the ship's rail to a fore and aft distance of 2.0 times the fore-to-aft dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle. Within this sector there shall be no objects rising above a maximum height of 25 cm above the level of the TLOF.~~

~~***Note*** — *Any objects located within the areas described in 4.2.23 and 4.2.24 that exceed the height of the TLOF are notified to the helicopter operator using a ship's helicopter landing area plan. For notification purposes it may be necessary to consider immoveable objects beyond the limit of the surface prescribed in 4.2.24 particularly if objects are significantly higher than 25 cm and in close proximity to the boundary of the LOS. See ICAO Heliport Manual (Doc 9261) for guidance.*~~



~~FIGURE17. SHIPS-SIDE NON-PUROSE-BUILT HELIPORT OBSTACLE LIMITATION SECTORS AND SURFACES~~

~~(ICAO ANNEEX14,VOL. II,Fig.4-11)~~

~~Winching areas~~

4.2.25 ~~An area designated for winching on-board ships shall be comprised of a circular clear zone of diameter 5 m and~~

~~extending from the perimeter of the clear zone, a concentric manoeuvring zone of diameter 2 D. (See Figure 4-12.)~~

4.2.26 ~~The manoeuvring zone shall be comprised of two areas:~~

~~a) the inner manoeuvring zone extending from the perimeter of the clear zone and of a circle of diameter not less than~~

~~1.5 D; and~~

~~b) the outer manoeuvring zone extending from the perimeter of the inner manoeuvring zone and of a circle of diameter~~

~~not less than 2 D.~~

4.2.27 ~~Within the clear zone of a designated winching area, no objects shall be located above the level of its surface.~~

4.2.28 ~~Objects located within the inner manoeuvring zone of a designated winching area shall not exceed a height of~~

~~3 m.~~

4.2.29 ~~Objects located within the outer manoeuvring zone of a designated winching area shall not exceed a height of~~

~~6 m.~~

~~Note.— See the Heliport Manual (Doc 9261) for guidanc~~

~~**Winching areas**~~

~~4.2.25. An area designated for winching on-board ships shall be comprised of a circular clear zone of diameter 5 m and extending from the perimeter of the clear zone, a concentric manoeuvring zone of diameter 2 D. (See Figure 18)~~

~~4.2.26. The manoeuvring zone shall be comprised of two areas:~~

~~(b) the inner manoeuvring zone extending from the perimeter of the clear zone and of a circle of diameter not less than 1.5 D; and~~

~~(b) the outer manoeuvring zone extending from the perimeter of the inner manoeuvring zone and of a circle of diameter not less than 2 D.~~

~~4.2.27. Within the clear zone of a designated winching area, no objects shall be located above the level of its surface.~~

~~4.2.28. Objects located within the inner manoeuvring zone of a designated winching area shall not exceed a height of 3m~~

~~4.2.29. Objects located within the outer manoeuvring zone of a designated winching area shall not exceed a height of 6m.~~

~~***Note** — See ICAO Heliport Manual (Doc 9261) for guidance.*~~

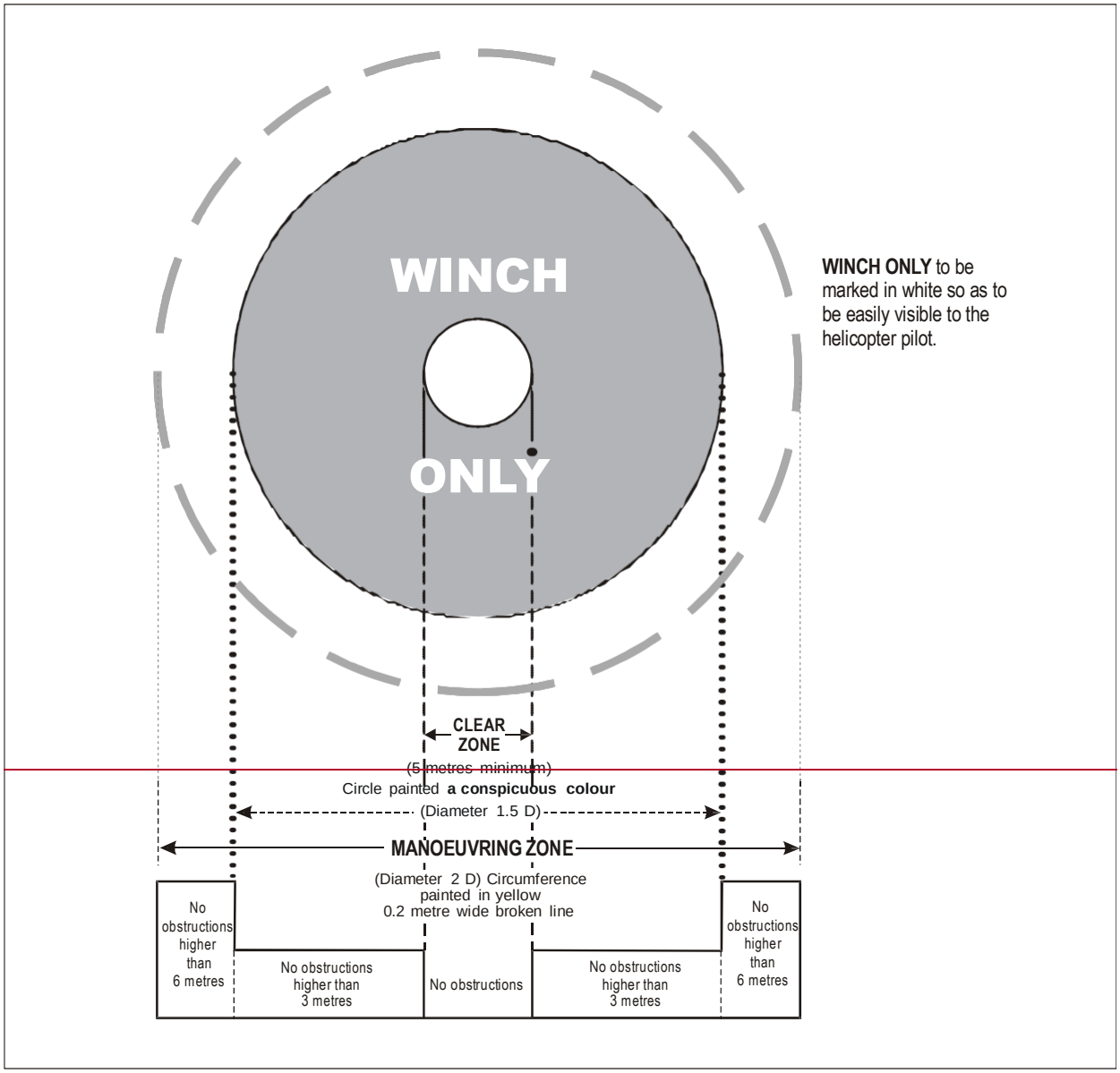


Figure 18. Winching area of a ship
(ICAO Annex 14, Vol II, Figure 4-12)

5.2.13.10 A helicopter taxiway edge marker shall not exceed a plane originating at a height of 25 cm above the plane of the helicopter taxiway, at a distance of 0.5 m from the edge of the helicopter taxiway and sloping upwards and outwards at a gradient of 5 per cent to a distance of 3 m beyond the edge of the helicopter taxiway.

5.2.13.11 A helicopter taxiway edge marker shall be blue.

Note 1 — Guidance on suitable edge markers is given in ICAO Heliport Manual (Doc 9261).

Note 2 — If blue markers are used on an aerodrome, signage may be required to indicate that the helicopter taxiway is suitable only for helicopters.

5.2.13.125 If the helicopter ground taxiway is to be used at night, the edge markers shall be internally illuminated or retro-reflective.

5.2.14. Helicopter air taxi-route markings and markers

Note.— *The objective of helicopter air taxi-route markings and markers is to provide to the pilot by day and, if necessary, by night, visual cues to guide movement along the air taxi-route.*

Application

5.2.14.1 The centre line of a helicopter air taxi-route shall be identified with markers or markings.

Location

5.2.14.2 A helicopter air taxi-route centre line marking or ~~flush in-ground centre line~~ markers shall be located along the centre line of the helicopter air taxi-route.~~way~~.

.

Characteristics

5.2.14.3 A helicopter air taxi-route centre line, when on a paved surface, shall be marked with a continuous yellow line 15 cm in width.

5.2.14.4 A helicopter air taxi-route centre line, ~~when on an unpaved surface~~ that will not accommodate painted markings, shall be marked with ~~flush in-ground 15 cm wide and approximately 1.5 m in length yellow~~ markers, spaced at intervals of not more than 30 m on straight sections and not more than 15 m on curves, with a minimum of four equally spaced markers per section.

Note.— *Further guidance on the characteristics of markers is provided in the Heliport Manual (Doc 9261).*

5.2.14.5 If the helicopter air taxi-route is to be used at night, helicopter air taxiway edge markers shall be either internally illuminated or retro-reflective.

5.2.15. Helicopter stand markings

Note.— *The objective of the helicopter stand markings is to provide to the pilot a visual indication of an area that is free of obstacles and in which permitted manoeuvring, and all necessary ground functions, may take place; identification, mass and D-value limitations, when required; and, guidance for manoeuvring and positioning of the helicopter within the stand.*

5.3. Lights

5.3.1. General

Note 1 *— See ICAO Annex 14, Volume I, 5.3.1, concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights.*

Note 2 *— In the case of helidecks and heliports located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.*

Note 3 *— As helicopters will generally come very close to extraneous light sources, it is particularly important to ensure that, unless such lights are navigation lights exhibited in accordance with international regulations, they are screened or located so as to avoid direct and reflected glare.*

Note 4 *—Systems addressed in sections 5.3.4, 5.3.6, 5.3.7, and 5.3.8 are designed to provide effective lighting cues based on night conditions. Where lights are to be used in conditions other than night (i.e. day or twilight) it may be necessary to increase the intensity of the lighting to maintain effective visual cues by use of a suitable brilliancy control. Guidance is provided in ICAO Aerodrome Design Manual (Doc 9157), Part 4 — Visual Aids.*

Note 5.— *The specifications for marking and lighting of obstacles included in Annex 14, Volume I, Chapter 6, are equally applicable to heliports and winching areas.*

Note 6.— *In cases where operations into a heliport are to be conducted at night with Night Vision Imaging Systems (NVIS), it is important to ensure ~~establish the compatibility of the NVIS system with~~ all heliport lighting are compatible with the NVIS such as through the addition of infrared emitters to the heliport lighting. Where such additional measures are not practicable, helicopter operators using NVIS are to be made aware of it. ~~an assessment by the helicopter operator prior to use.~~*

5.3.2. Heliport beacon

Note.— *The objective of a heliport beacon is to make a heliport more conspicuous to assist the pilot to locate and identify the heliport at night and/or by day in reduced visibility.*

Application

5.3.2.1 A heliport beacon should be provided at a heliport where:

(a) long-range visual guidance is considered necessary and is not provided by other visual means; or

(b) identification of the heliport is difficult due to surrounding lights.

Location

5.3.2.2 The heliport beacon shall be located on or adjacent to the heliport preferably at an elevated position and so that it does not dazzle a pilot at short range.

Note *— Where a heliport beacon is likely to dazzle pilots at short range, it may be switched off during the final stages of the approach and landing.*

Characteristics

5.3.2.3 The heliport beacon shall emit repeated series of equispaced short duration white flashes in the format in Figure 5-11~~28~~.

5.3.2.4 The light from the beacon shall show at all angles of azimuth.

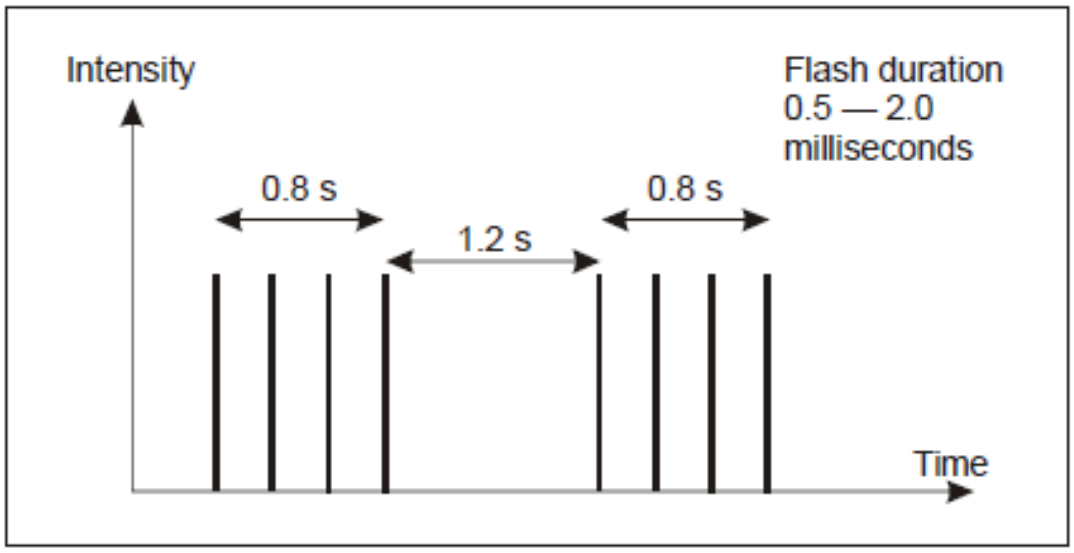


Figure 5-11. Heliport beacon flash characteristics

5.3.2.5 The effective light intensity distribution of each flash should be as shown in Figure 5-1211, Illustration 1.

Note — *Where brilliancy control is desired, settings of 10 per cent and 3 per cent have been found to be satisfactory. In addition, shielding may be necessary to ensure that pilots are not dazzled during the final stages of the approach and landing.*

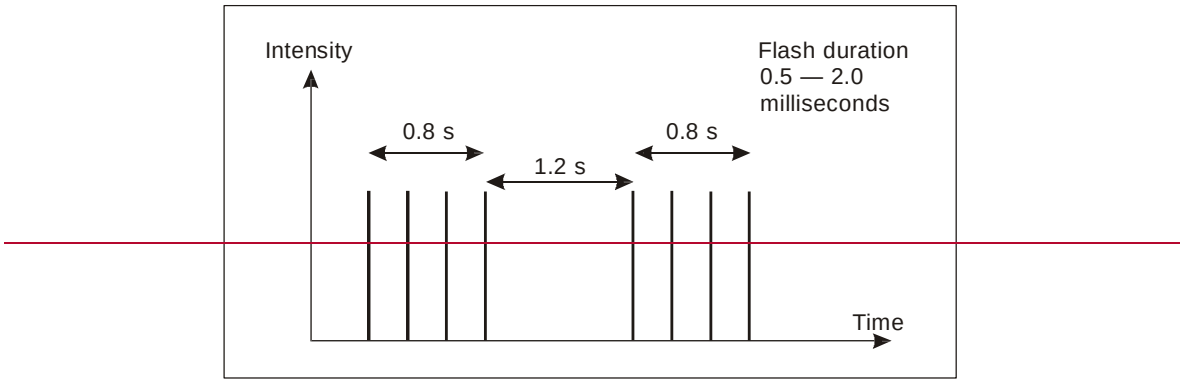


Figure 28. Heliport beacon flash characteristics
(ICAO Annex 14 Vol II, Fig 5-10)

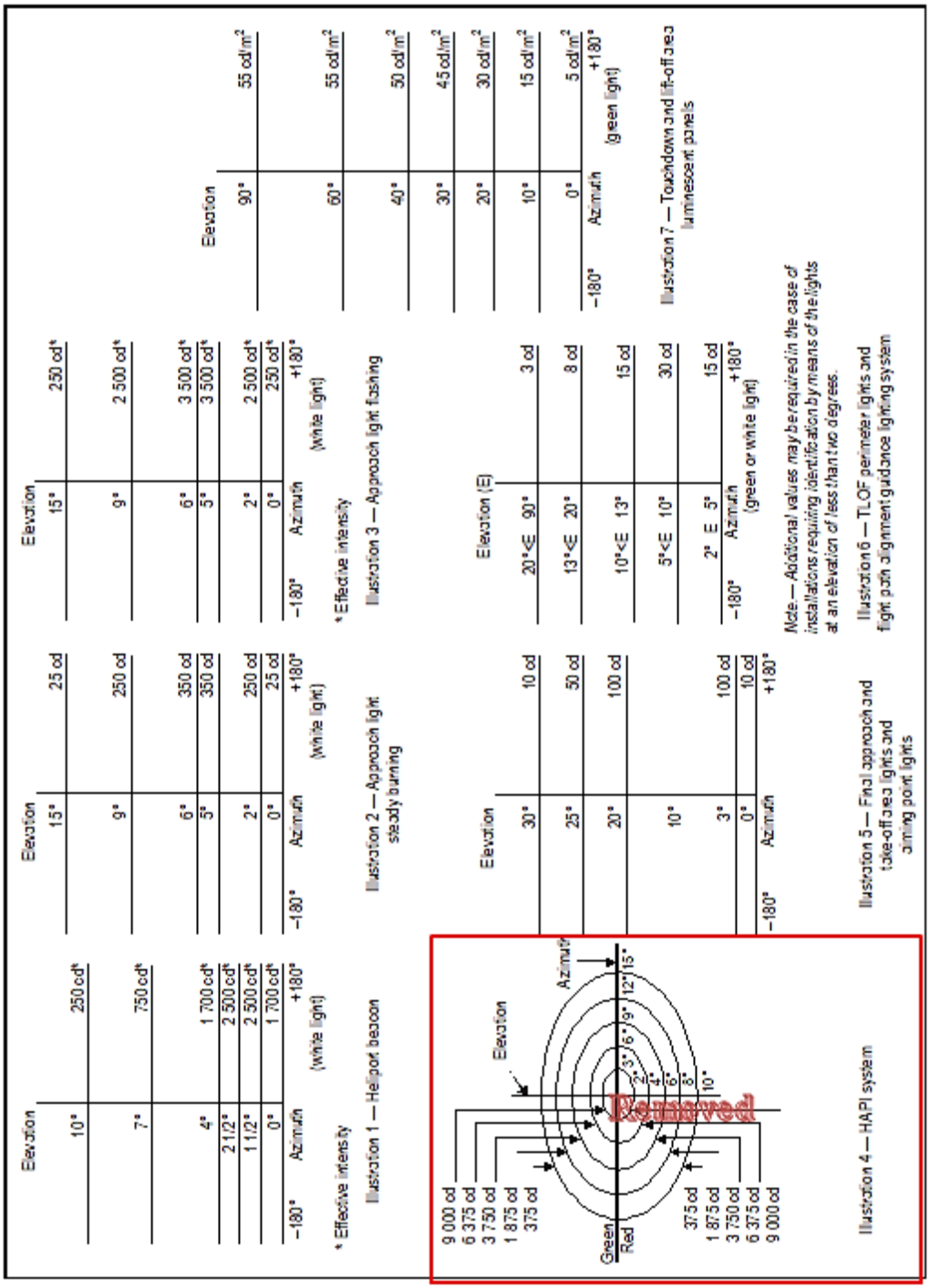


Figure5-11. Isocandela diagrams

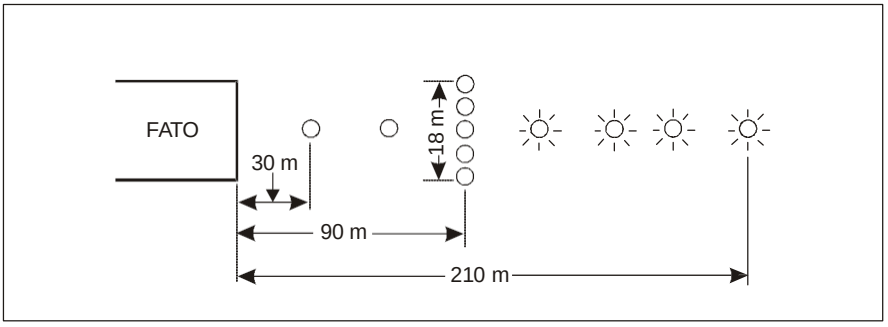


Figure 30. Approach lighting system
(ICAO Annex 14, Vol II, Fig 5-12)

5.3.3. Approach lighting system~~z~~

Note.— *The objective of an approach lighting system is to allow the helicopter operator, by day and night, to visually identify the heliport and align the helicopter on the centreline of the FATO upon arriving at a prescribed point on the approach flight path.*

Application

5.3.3.1 An approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction.

Location

5.3.3.2 The approach lighting system shall be located in a straight line along the preferred direction of approach.

Characteristics

5.3.3.3 An approach lighting system should consist of a row of three lights spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the FATO as shown in Figure 30. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights and spaced at 4.5 m intervals. Where there is the need to make the final approach course more conspicuous, additional lights spaced uniformly at 30 m intervals should be added beyond the crossbar. The lights beyond the crossbar may be steady or sequenced flashing, depending upon the environment.

Note *— Sequenced flashing lights may be useful where identification of the approach lighting system is difficult due to surrounding lights.*

5.3.3.4 The steady lights shall be omnidirectional white lights.

5.3.3.5 Sequenced flashing lights shall be omnidirectional white lights.

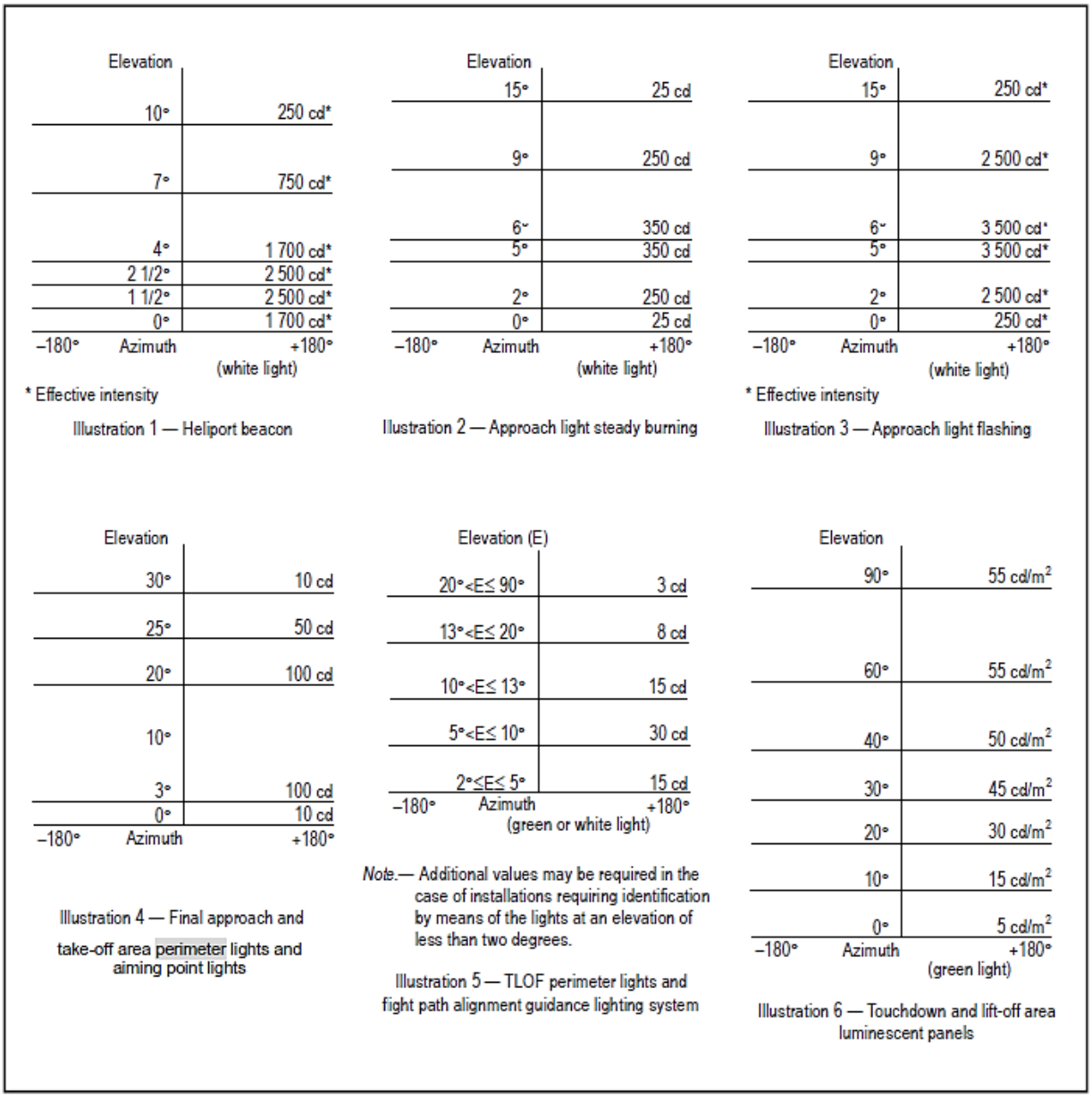


Figure 5-12. Isocandela diagrams

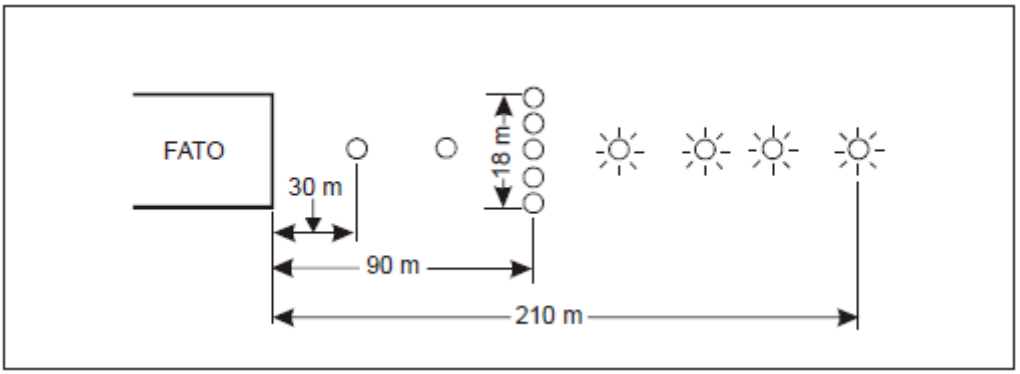


Figure 5-13. Approach lighting system

5.3.3.6 The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure 5-12~~29~~, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.

5.3.3.7 A suitable brilliancy control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions.

Note *— The following intensity settings have been found suitable:*

(a) *steady lights — 100 per cent, 30 per cent and 10 per cent; and*

(b) *flashing lights — 100 per cent, 10 per cent and 3 per cent.*

5.3.4. Flight path alignment guidance lighting system

Note.— *The objective of a flight path alignment guidance lighting system is to indicate, by day, night, and in reduced visibility, available approach and/or departure flight path direction(s).*

Application

5.3.4.1 *Flight path alignment guidance lighting system(s) should be provided at a heliport where it is desirable and practicable to indicate available approach and/or departure path direction(s).*

Note *— The flight path alignment guidance lighting can be combined with a flight path alignment guidance marking(s) described in 5.2.18.*

Location

5.3.4.2 The flight path alignment guidance lighting system shall be in a straight line along the direction(s) of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO, TLOF or safety area.

5.3.4.3 *If combined with a flight path alignment guidance marking, as far as is practicable the lights should be located inside the "arrow" markings.*

Characteristics

5.3.4.4 *A flight path alignment guidance lighting system should consist of a row of three or more lights spaced uniformly a total minimum distance of 6 m. Intervals between lights should not be less than 1.5 m and should not exceed 3 m. Where space permits there should be 5 lights. (See Figure 5-1027.)*

***Note** — The number of lights and spacing between these lights may be adjusted to reflect the space available. If more than one flight path alignment system is used to indicate available approach and/or departure path direction(s), the characteristics for each system are typically kept the same. (See Figure 5-1027.)*

5.3.4.5 The lights shall be steady omnidirectional inset white lights.

5.3.4.6 The distribution of the lights should be as indicated in Figure 5-1229, Illustration 56.

5.3.4.7 A suitable control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions and to balance the flight path alignment guidance lighting system with other heliport lights and general lighting that may be present around the heliport.

5.3.5. Visual alignment guidance system

***Note.—** The objective of a visual alignment guidance system is to provide conspicuous and discrete cues to assist the pilot to attain, and maintain, a specified approach track to a heliport. Guidance on suitable visual alignment guidance systems is given in the Heliport Manual (Doc 9261).*

Application

5.3.5.1 A visual alignment guidance system should be provided to serve the approach to a heliport where one or more of the following conditions exist especially at night:

(a) obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

(b) the environment of the heliport provides few visual surface cues; and

(c) it is physically impracticable to install an approach lighting system.

5.3.6. Visual approach slope indicator

Note.— *The objective of a visual approach slope indicator is to provide conspicuous and discrete colour cues within a specified elevation and azimuth, to assist the pilot to attain and maintain the approach slope to a desired position within a FATO. Guidance on suitable visual approach slope indicators is given in ICAO* Heliport Manual *(Doc 9261).*

Application

5.3.6.1 A visual approach slope indicator should be provided to serve the approach to a heliport, whether or not the heliport is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist especially at night:

(a) obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;

(b) the environment of the heliport provides few visual surface cues; and

(c) the characteristics of the helicopter require a stabilized approach.

5.3.7. Final approach and take-off area perimeter lights~~lighting systems~~ for surface-level heliports

Note.— *The objective of a final approach and take-off area perimeter lights~~lighting system~~ for onshore surface-level heliports is to provide to the pilot operating at night an indication of the shape, location and extent of the FATO.*

Application

5.3.7.1 Where a FATO is with a solid surface established at a surface-level heliport intended for use at night, FATO perimeter lights shall be provided except that they may be omitted where the FATO and the TLOF are nearly coincidental or the extent of the FATO is self-evident.

Location

5.3.7.2 FATO perimeter lights shall be placed along the edges of the FATO. The lights shall be uniformly spaced as follows:

(a) for an area in the form of a square or rectangle, at intervals of not more than 50 m with a minimum of four lights on each side including a light at each corner; and

(b) for any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

Characteristics

5.3.7.3 FATO perimeter lights shall be fixed omnidirectional lights showing green or white with variable intensity. Green perimeter lights shall be permitted only when the FATO is a dynamic load-bearing surface.~~Where the intensity of the lights is to be varied the lights shall show variable white~~.

Note.— *Further guidance on colour selection of FATO perimeter lights is provided in the Heliport Manual (Doc 9261).*

5.3.7.4 The light distribution of FATO perimeter lights should be as shown in Figure5-121, Illustration 4.

5.3.7.5 The lights should not exceed a height of 25 cm and should be inset when a light extending above the surface would endanger helicopter operations. Where a FATO is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground or snow level.

5.3.8. Aiming point lights

Note.— The objective of aiming point lights is to provide a visual cue indicating to the pilot by night the preferred approach/departure direction; the point to which the helicopter approaches to a hover before positioning to a TLOF, where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

Application

5.3.8.1 *Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights should be provided.*

Location

5.3.8.2 Aiming point lights shall be collocated with the aiming point marking.

Characteristics

5.3.8.3 Aiming point lights shall form a pattern of at least six omnidirectional white lights as shown in Figure 5-724. The lights shall be arranged equidistantly with a light at the apex and at both corners. The lights shall be inset when a light extending above the surface could endanger helicopter operations.

5.3.8.4 The light distribution of aiming point lights should be as shown in Figure 5-121, Illustration 4.

5.3.9. Touchdown and lift-off area lighting system

Note.— *The objective of a touchdown and lift-off area lighting system is to provide illumination of the TLOF and required elements within. For a TLOF located in a FATO, the objective is to provide discernibility, to the pilot on a final approach, of the TLOF and required elements within; while for a TLOF located on an elevated heliport, shipboard heliport or helideck, the objective is visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.*

Application

5.3.9.1 A TLOF lighting system shall be provided at a heliport intended for use at night.

Note.— *Where a TLOF is located in a stand, the objective may be met with the use of ambient lighting or stand floodlighting (see 5.3.10).*

5.3.9.2 For a surface-level heliport, lighting for the TLOF in a FATO shall consist of ~~one or more~~either of the following:

(a) perimeter lights; or

~~(b) floodlighting;~~

~~(c)~~(b) arrays of segmented point source lighting (ASPSL) or luminescent panel (LP) lighting to identify the TLOF perimeter when a) ~~and b) are~~is not practicable and FATO perimeter lights are available.

5.3.9.3 For an elevated heliport, shipboard heliport or helideck, lighting of the TLOF in a FATO shall consist of:

(a) perimeter lights; and

(b) ASPSL and/or LPs to identify the ~~TDPM~~ TDPC and/or floodlighting to illuminate the TLOF.

Note — *Guidance on suitable systems is contained in the Heliport Manual (Doc 9261).~~At elevated heliports, shipboard heliports and helidecks, surface texture cues within the TLOF are essential for helicopter positioning during the final approach and landing. Such cues can be provided using various forms of lighting (ASPSL, LP, floodlights or a combination of these lights, etc.) in addition to perimeter lights. Best results have been demonstrated by the combination of perimeter lights and ASPSL in the form of encapsulated strips of light emitting diodes (LEDs) and inset lights to identify the TDPM and heliport identification markings.~~*

5.3.9.4 When enhanced surface texture cues are required at a TLOF ASPSL and/or LPs to identify the ~~TDPM~~ TDPC and/ or floodlighting should be provided at a surface-level heliport intended for use at night ~~when enhanced surface texture cues are required~~.

Location

5.3.9.5 TLOF perimeter lights shall be placed along the edge of the area designated for use as the TLOF or within a distance of 1.5 m from the outer edge. TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated heliports, helidecks and shipboard heliports and not more than 5 m for surface-level heliports. ~~Where the TLOF is a circle the lights shall be:~~

~~located on straight lines in a pattern which will provide information to pilots on drift displacement; and~~

~~where a) is not practicable, evenly spaced around the perimeter of the TLOF at the appropriate interval, except that over a sector of 45 degrees the lights shall be spaced at half spacing.~~

~~5.3.9.6 TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated heliports and helidecks and not more than 5 m for surface-level heliports. There shall be a minimum number of four lights on each side including a light at each corner. For a circular TLOF, where lights are installed in accordance with 5.3.9.5 b) there shall be a minimum of fourteen lights.~~

Note — *Where the TLOF is circular, drift of the helicopter may be difficult to discern by the pilot. Guidance on lighting patterns to counter drift displacement over the TLOF ~~this issue~~ is contained in ICAO Heliport Manual (Doc 9261).*

5.3.9.6~~7~~ The TLOF perimeter lights shall be installed at an elevated heliport or fixed helideck such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

5.3.9.7~~8~~ The TLOF perimeter lights shall be installed on a moving helideck or shipboard heliport, such that the pattern cannot be seen by the pilot from below the elevation of the TLOF when the helideck or shipboard heliport is level.

5.3.9.89 On surface-level heliports, ASPSL or LPs, if provided to identify the TLOF, shall be placed along the marking designating the edge of the TLOF. Where the TLOF is a circle, they shall be located on straight lines circumscribing the area.

~~5.3.9.10 On surface-level heliports the minimum number of LPs on a TLOF shall be nine. The total length of LPs in a pattern shall not be less than 50 per cent of the length of the pattern. There shall be an odd number with a minimum number of three panels on each side of the TLOF including a panel at each corner. LPs shall be uniformly spaced with a distance between adjacent panel ends of not more than 5 m on each side of the TLOF.~~

~~5.3.9.11 *When LPs are used on an elevated heliport or helideck to enhance surface texture cues, the panels should not be placed adjacent to the perimeter lights. They should be placed around a touchdown marking or coincident with heliport identification marking.*~~

5.3.9.912 TLOF floodlights where provided shall be ~~located~~ arranged so as to avoid glare to pilots in flight ~~or~~ and to personnel working on the area. ~~The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.~~

Note — *Detailed specifications on the number of lights to be provided, based on the shape and size of the TLOF are contained in the Heliport Manual (Doc 9261).~~ASPSL and LPs used to designate the and/or heliport identification marking have been shown to provide enhanced surface texture cues when compared to low-level floodlights. Due to the risk of misalignment, if floodlights are used, there will be a need for them to be checked periodically to ensure they remain within the specifications contained within 5.3.9.~~*

Characteristics

5.3.9.1013 The TLOF perimeter lights shall be fixed omnidirectional lights showing green.

5.3.9.1114 At a surface-level heliport, ASPSL or LPs shall emit green light when used to define the perimeter of the TLOF.

5.3.9.1215 The chromaticity and luminance of colours of LPs should conform to ICAO Annex 14, Volume I, Appendix 1, 3.4.

5.3.9.1316 An LP shall have a minimum width of 6 cm. The panel housing shall be the same colour as the marking it defines.

5.3.9.1417 For a surface level or elevated heliport, the TLOF perimeter lights located in a FATO shall not exceed a height of 25 cm and should be inset when a light extending above the surface could endanger helicopter operations.

5.3.9.1518 For a helideck or shipboard heliport, the TLOF perimeter lights shall not exceed a height of 5 cm, or for a FATO/TLOF, 15 cm.

5.3.9.1619 When located within the safety area of a surface level or elevated heliport, the TLOF floodlights should not exceed a height of 25 cm.

5.3.9.1720 For a helideck or shipboard heliport, the TLOF floodlights shall not exceed a height of 5 cm, or for a FATO/TLOF, 15 cm.

5.3.9.1821 The ASPSL and LPs shall not extend above the surface by more than 2.5 cm.

Note.— *Guidance on panel profiles and loading limitations is contained in the Heliport Manual (Doc 9261).*

5.3.9.~~22~~19 The light distribution of the perimeter lights should be as shown in, FIGURE5-1211, Illustration 5.

Note.— *The light distribution of the ASPSL and/or LPs used to illuminate the TDPC and heliport identification marking, or cross (chevron) markings at a hospital, are detailed in the Heliport Manual (Doc 9261).* ~~*5.3.9.23 The light distribution of the LPs should be as shown in Figure 5-11, Illustration 6.*~~

5.3.9.20~~24~~ The spectral distribution of TLOF area floodlights shall be such that the surface and obstacle marking can be correctly identified.

~~*5.3.9.25 The average horizontal illuminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1 measured on the surface of the TLOF.*~~

~~*5.3.9.26 Lighting used to identify the TDPC should comprise a segmented circle of omnidirectional ASPSL strips showing yellow. The segments should consist of ASPSL strips, and the total length of the ASPSL strips should not be less than 50 per cent of the circumference of the circle.*~~

5.3.9.21~~27~~ If utilised, the heliport identification marking lighting, or cross marking lighting at a hospital, should be omnidirectional showing green.

5.3.10 Helicopter stand floodlighting

Note.— The objective of helicopter stand floodlighting is to provide illumination of the stand surface and associated markings to assist the manoeuvring and positioning of a helicopter and facilitation of essential operations around the helicopter.

Application

5.3.10.1 *Floodlighting should be provided on a helicopter stand intended to be used at night.*

Note.— Guidance on stand floodlighting is given in the apron floodlighting section in ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Location

5.3.10.2 *Helicopter stand floodlights should be located so as to provide adequate illumination, with a minimum of glare to the pilot of a helicopter in flight and on the ground, and to personnel on the stand. The arrangement and aiming of floodlights should be such that a helicopter stand receives light from two or more directions to minimize shadows.*

Characteristics

5.3.10.3 The spectral distribution of stand floodlights shall be such that the colours used for surface and obstacle marking can be correctly identified.

5.3.10.4 Horizontal and vertical illuminance shall be sufficient to ensure that visual cues are discernible for required manoeuvring and positioning, and essential operations around the helicopter can be performed expeditiously without endangering personnel or equipment.

5.3.11. **Winching area floodlighting**

Note.— The objective of winching area floodlighting is to provide illumination of the surface, obstacles and visual cues to assist a helicopter to be positioned over, and retained within, an area from which a passenger or equipment can be lowered or raised.

Application

5.3.11.1 Winching area floodlighting shall be provided at a winching area intended for use at night.

Location

5.3.11.2 Winching area floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

Characteristics

5.3.11.3 The spectral distribution of winching area floodlights shall be such that the surface and obstacle markings can be correctly identified.

5.3.11.4 *The average horizontal illuminance should be at least 10 lux, measured on the surface of the winching area.*

5.3.12. **Taxiway lights**

Note *— The specifications for taxiway centre line lights and taxiway edge lights in ICAO Annex 14, Volume I, 5.3.16 and 5.3.17, are equally applicable to taxiways intended for ground taxiing of helicopters.*

5.3.13. **Visual aids for denoting obstacles** outside and below the obstacle limitation surfaces

Note.— *Arrangements for an aeronautical study of objects outside the obstacle limitation surface (OLS) and for other objects are addressed in ICAO Annex 14, Volume I, Chapter 4.*

5.3.13.1 Where an aeronautical study indicates that obstacles in areas outside and below the boundaries of the OLS, established for a heliport, constitute a hazard to helicopters, they should be marked and lit, except that the marking may be omitted when the obstacle is lighted with high-intensity obstacle lights by day.

5.3.13.2 Where an aeronautical study indicates that overhead wires or cables crossing a river, waterway, valley or highway constitute a hazard to helicopters, they should be marked, and their supporting towers marked and lit.

5.3.14. **Floodlighting of obstacles**

Note.— *The objective of obstacle floodlighting is to highlight the shape and location of obstacles in the vicinity of the heliport, to assist a pilot flying at night to avoid all obstacles by a safe margin.*